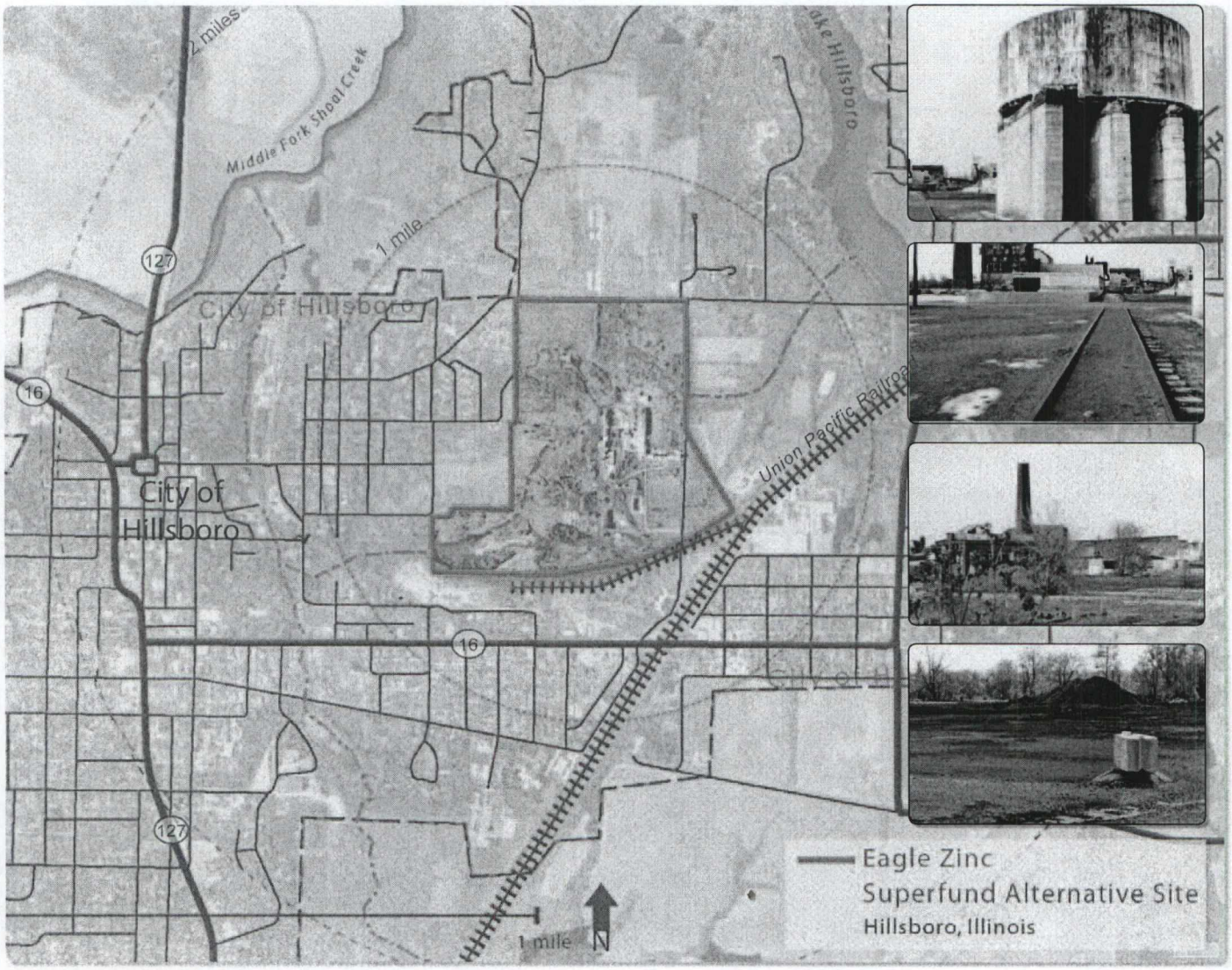

Eagle Zinc Superfund Alternative Site

Future Use Overlay Analysis and Conceptual Reuse Framework

Hillsboro, Illinois

March 2006 ***(draft)***

EPA Region 5
Superfund Redevelopment Initiative

funded by
United States Environmental Protection Agency

prepared for
The City of Hillsboro
Hillsboro, Illinois

prepared by
E² Inc.

Acknowledgements

E² Inc. would like to thank the following people and organizations for their hard work in support of the overlay analysis and for their valuable contributions to this report.

Project Stakeholder Committee Members
William M. Baran, City of Hillsboro, Mayor
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Tom Gooding, City of Hillsboro, Planning Commission
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Appendix B: Industrial Site Reuse Case Studies
Appendix C: Community-Scaled Economic Development Case Studies
Appendix D: List of Project-Related Acronyms

Project Overview

The U.S. Environmental Protection Agency (EPA)'s primary responsibility at Superfund Alternative (SA) sites is the protection of human health and the environment. Since 1995, it has also been EPA policy to consider reasonably anticipated future land uses at Superfund Alternative sites, so that the remediation of SA sites like the Eagle Zinc site can allow for the safe reuse of a site for commercial, industrial, recreational, ecological, or other purposes.

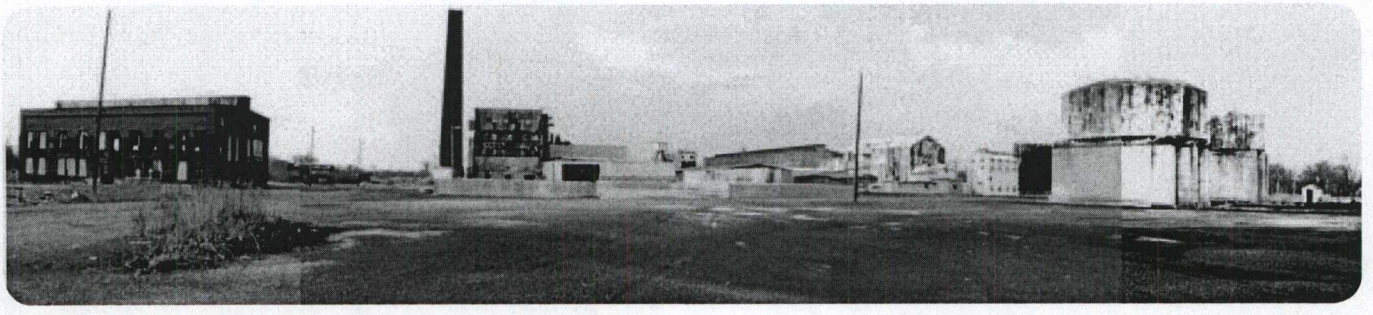
EPA funded this project in Spring 2005 to address unnecessary obstacles to the Eagle Zinc site's reuse, ensure the protectiveness of the site's future remedy, and help integrate the site as a significant community resource within the City of Hillsboro, Illinois.

The Eagle Zinc SA Future Reuse Overlay Analysis highlights the site's existing conditions, surrounding context, and potential reuse opportunities and challenges that need to be addressed to ensure the most desirable long-term outcomes at the site. The report also includes site-related research components that could help inform stakeholder decisions in the near and long term regarding the future reuse of the Eagle Zinc site. The goal of the future use overlay analysis is to enhance the City of Hillsboro's efforts to plan for future use of the Eagle Zinc site.

The future reuse overlay analysis also reviews potential remedial alternatives that could be coordinated with the implementation of the revised future reuse and long-term stewardship framework plan also outlined in this report. The framework is seen as a flexible plan, based on the site's existing physical conditions and based on historical uses of the site. The resulting strategy is called a "framework" because it represents an early plan, a flexible structure able to incorporate additional detail and information over time.

This report also includes a summary of the reuse planning and analysis process for the Eagle Zinc site and identifies local, state, and federal resources to help the community move the site back into use. The project report also identifies reuse opportunities and challenges at the site, and outlines key considerations and next steps. The findings in this report are based on research, analysis, and interviews with community and technical advisor members conducted by the project's consultant team. Copies of the report have been provided to the City of Hillsboro and EPA Region 5 to be incorporated into the city and EPA's future planning efforts.

The 132-acre Eagle Zinc Superfund Alternative site is located on the east side of Hillsboro, Illinois at RD 1200 E. Smith St, just north of State Route 16.

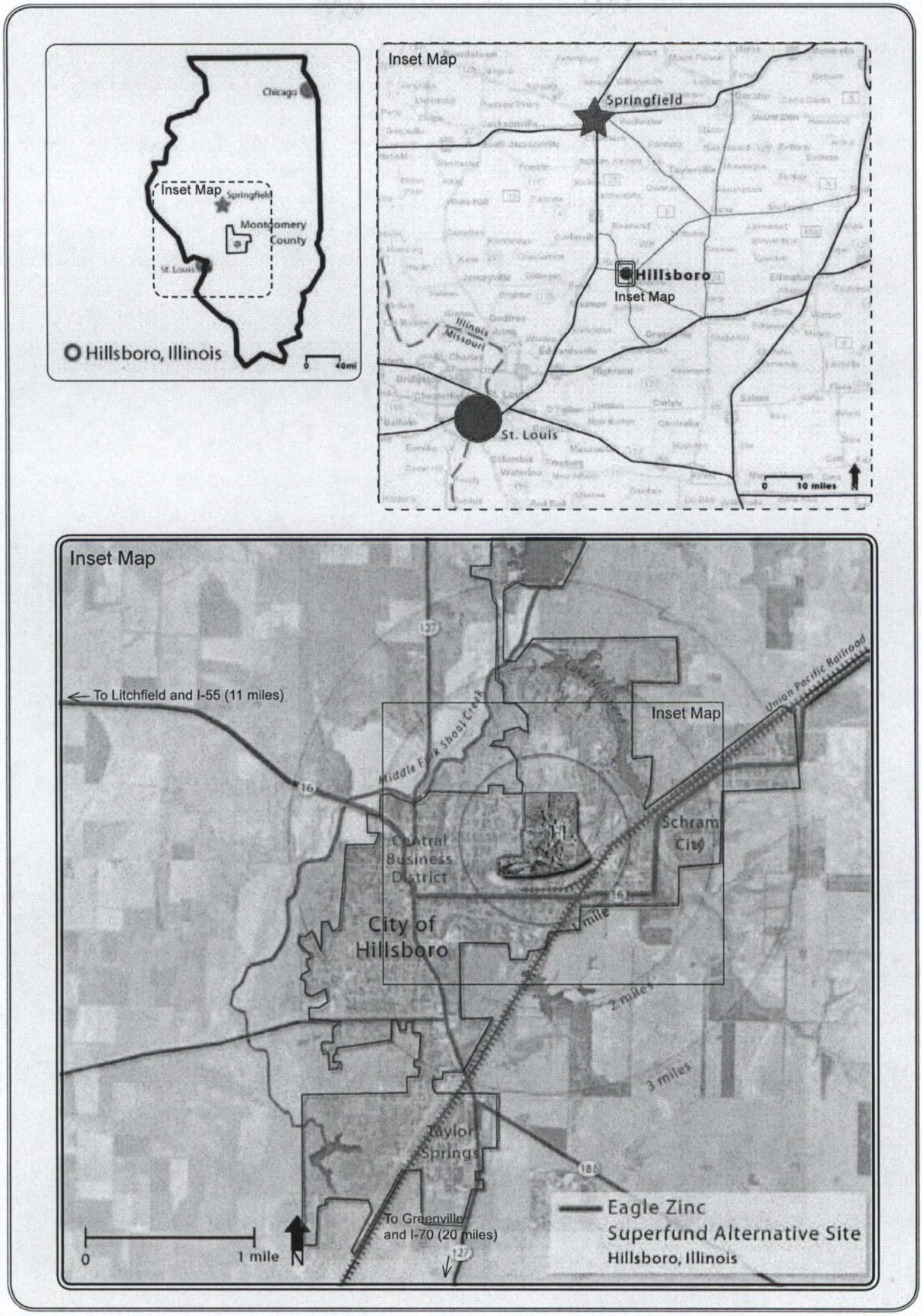


Above: Views of the site's former zinc and zinc oxide manufacturing buildings and laboratories (top) and residue piles (bottom).

Eagle Zinc Superfund Alternative Site:

Regional Location

The 132-acre Eagle Zinc Superfund Alternative site is located in the City of Hillsboro, Montgomery County, in south-central Illinois (see maps, page 7.) The City of Hillsboro (pop. 6,291), located at the junction of Routes 127 and 16, is the county seat of Montgomery County. Major transportation arteries near Hillsboro include Interstate 55, eleven miles west of the city, and Interstate 70, twenty-two miles to the south. Springfield, Illinois, approximately fifty miles north, and St. Louis, Missouri, sixty-five miles to the southwest, are the city's closest major urban centers. Smaller cities include Litchfield, located eleven miles west of Hillsboro, and Greenville, located twenty-one miles to the south of Hillsboro.


Chicago
Inset Map
Springfield
Montgomery County
St. Louis
Hillsboro, Illinois
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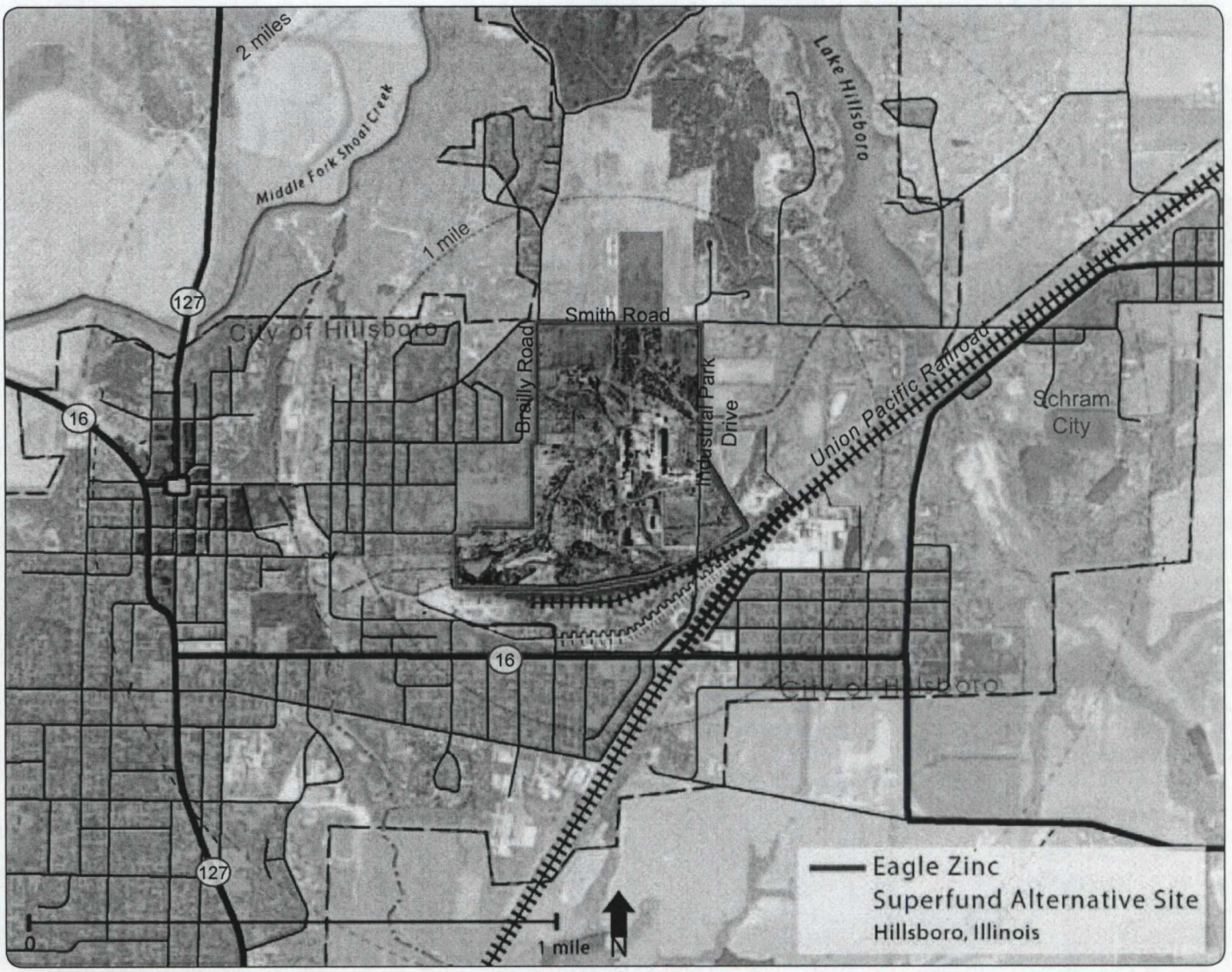
Illinois
Missouri
St. Louis
0 10 miles
Inset Map
To Litchfield and I-55 (11 miles)
Middle Fork Shoal Creek
Lake Hillsboro
Union Pacific Railroad
Inset Map
Central Business District
Schram City
City of Hillsboro
1 mile
2 miles
3 miles
Taylor Springs
To Greenville and I-70 (20 miles)
0
1 mile
N
Eagle Zinc
Superfund Alternative Site
Hillsboro, Illinois

Eagle Zinc Superfund Alternative Site Context:

Surrounding Land Uses

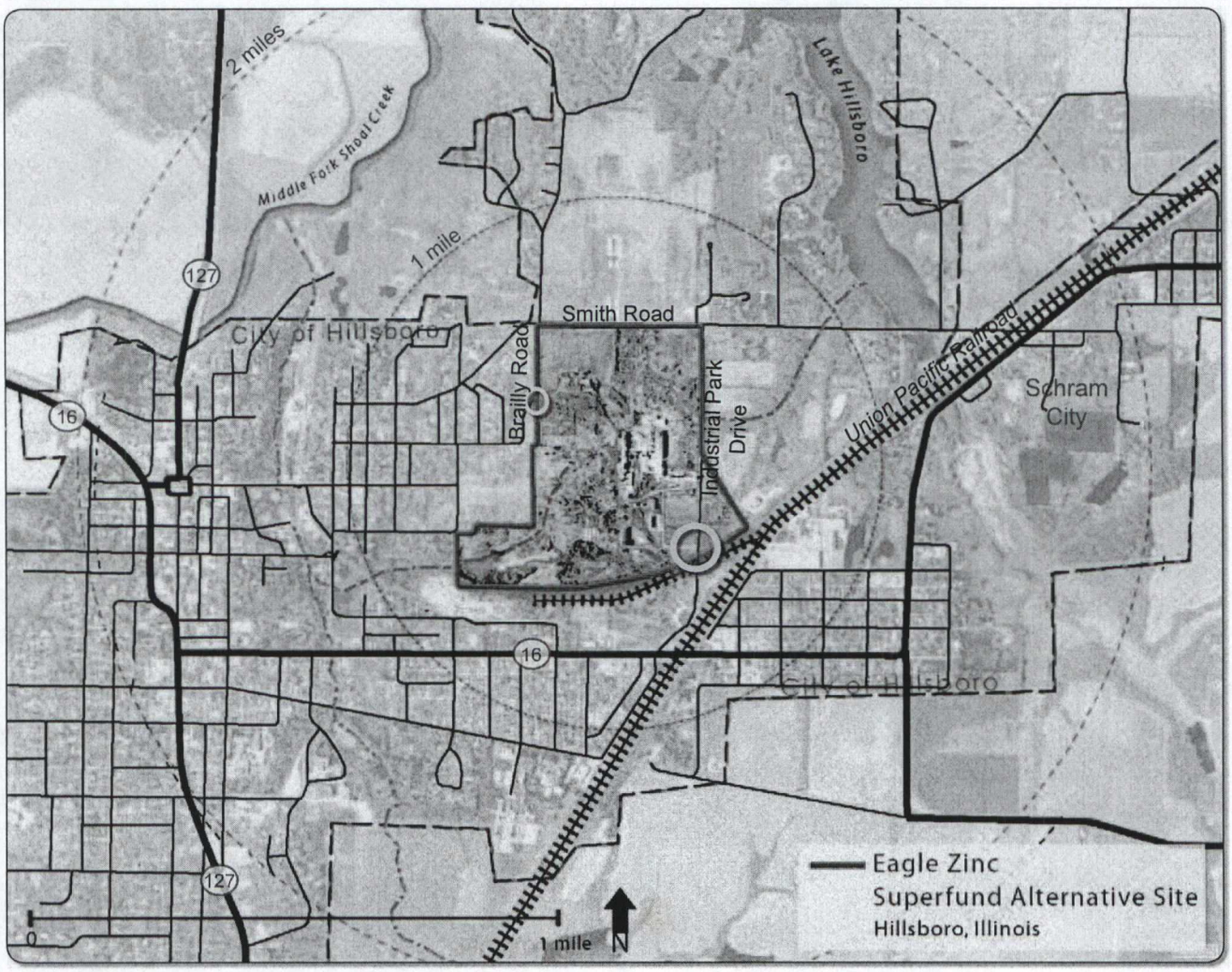
The Eagle Zinc site is located on the east side of Hillsboro, within one and a half miles of the city's central business district, at 1200 E. Smith Street, in a mixed-use area that includes residential, commercial, industrial, and recreational uses. Industrial properties and State Route 16 border the site's southern edge. Industrial Park Drive runs through the southeastern portion of the site and borders the site's northeastern edge. The northern edge is bordered by Smith Road, several recreational facilities, residential areas, and a few small-scale commercial operations. Brailly Road and a residential neighborhood extend along the site's western edge. The site's southwestern edge is part of a stormwater drainage area that feeds into Middle Fork Shoal Creek, located on the northwest side of Hillsboro. Each of the land use types are described and diagrammed separately in the following pages.



Surrounding Transportation Network and Site Access:

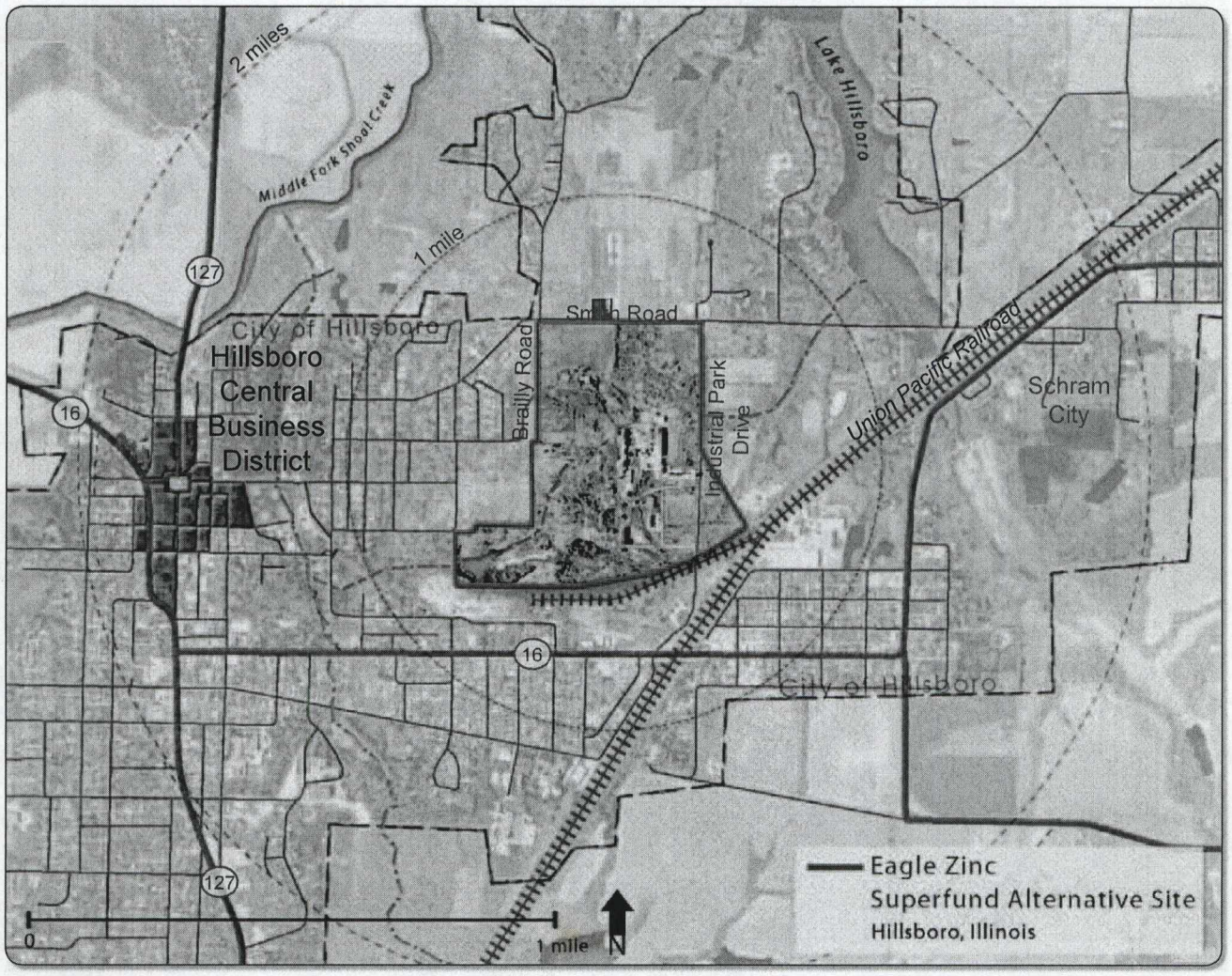
The Eagle Zinc site can be accessed by vehicle via a network of state highways and secondary roads and by rail via a rail spur off of the Union Pacific Rail Line. The nearest commercial airport is Lambert International Airport, located 45 miles away in St. Louis, Missouri. The City of Hillsboro operates the Hillsboro Municipal Airport, a small public facility. A Union Pacific rail line runs through Hillsboro in a northeast/southwest direction, connecting Taylor Springs, Hillsboro, and Schram City.

The site's primary vehicular access is from Industrial Park Road, which runs north-south off State Highway 16. Brailly Road, a residential street that extends to the northwest portion of the site, provides secondary access to the site. Both Smith Road, located along the site's northern edge, and Industrial Park Road are main through roads for area residents. The roads connect the city's downtown and Route 16 with the Lake Hillsboro area, which includes the Hillsboro Sports Complex, Hillsboro Country Club, residential neighborhoods, and Lake Hillsboro recreation sites.



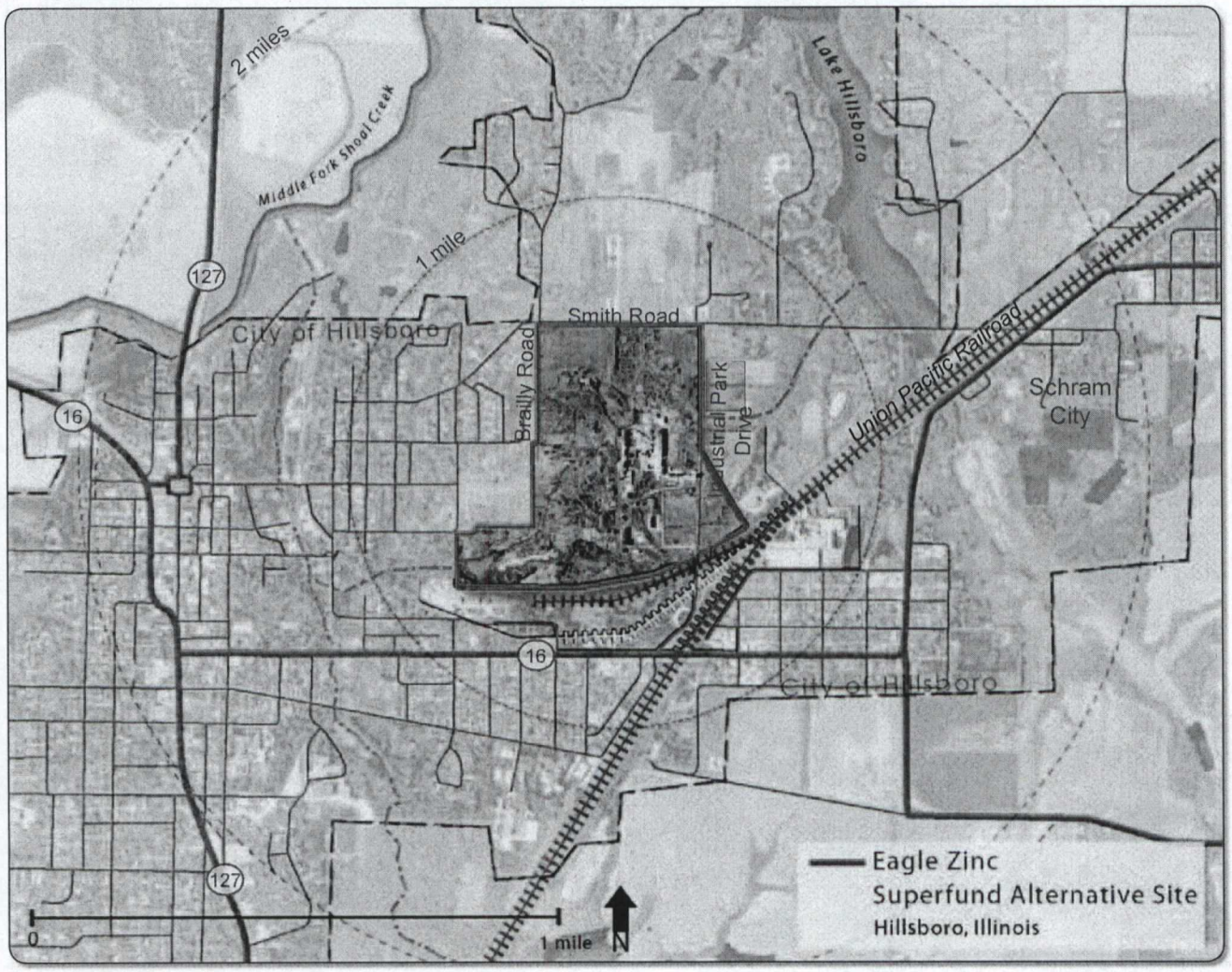
Surrounding Commercial Land Uses and Hillsboro's Central Business District

The Eagle Zinc site is located within two miles of Hillsboro's Central Business District, which includes a range of locally-owned and operated businesses and service providers. Several small-scale commercial operations are located just north of the site.



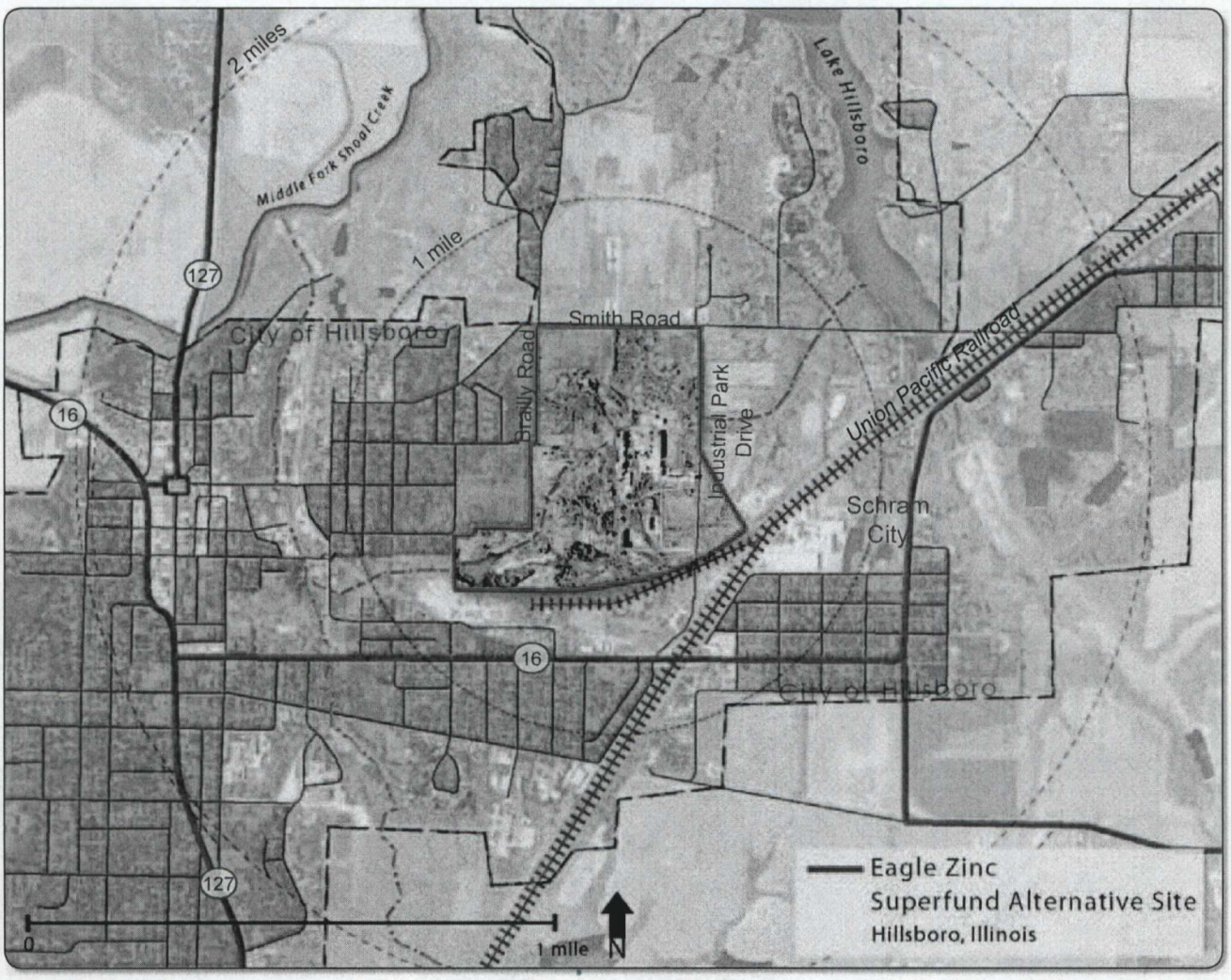
Surrounding Industrial Land Uses

The Eagle Zinc site and neighboring parcels to the site's east, south, and southeast are zoned for industrial land uses. Neighboring industries include Hixon Lumber, along the site's southern edge, and a former glass factory, which operated from 1905 through 1997, located northeast of the site. Litchfield Bituminous Corporation currently occupies the industrial property, located east of the site.



Surrounding Residential Land Uses

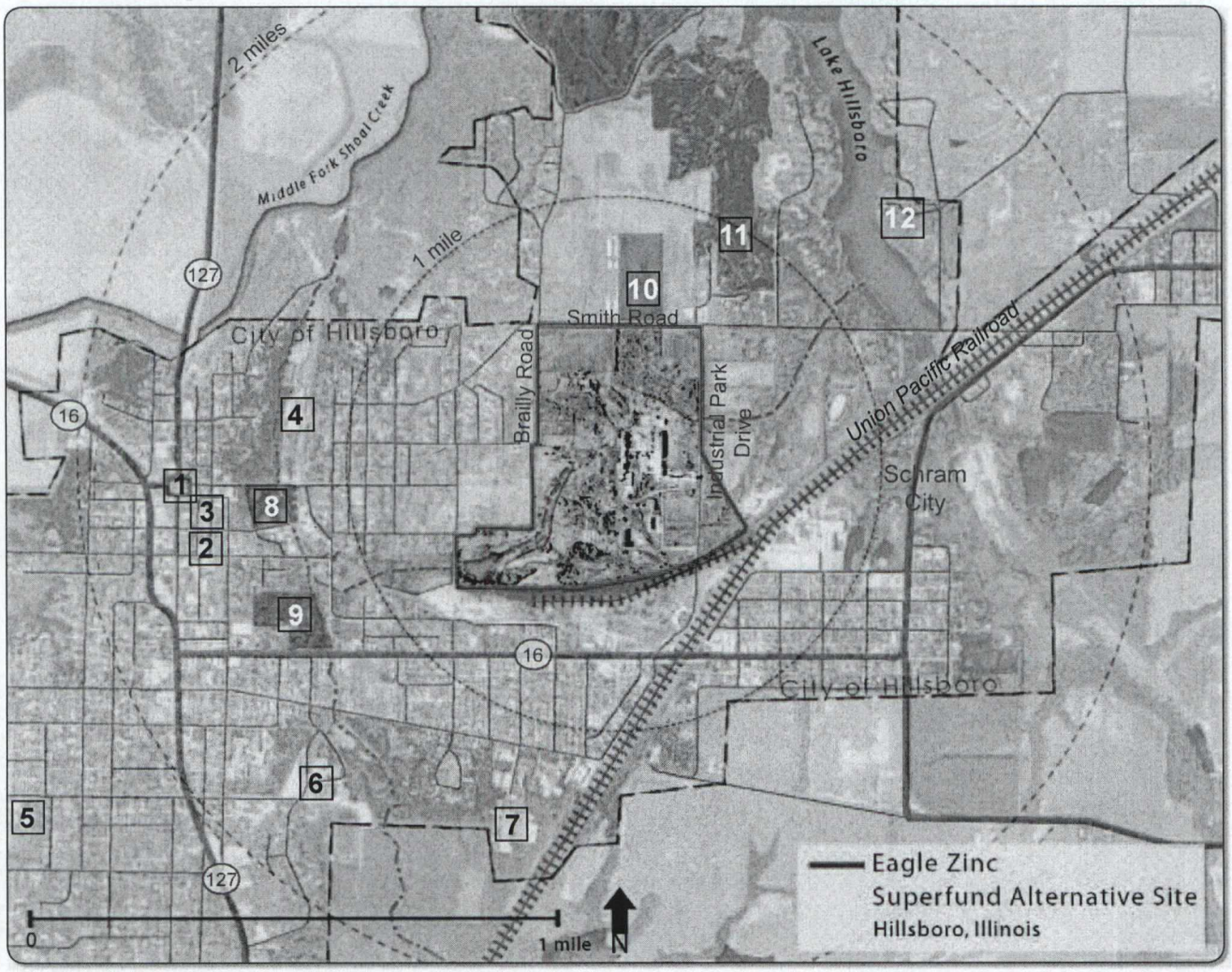
The Eagle Zinc site is located adjacent to several residential neighborhoods, with the closest home located approximately 200 feet from the western site boundary. Density of neighborhood residences is highest west and south of the site. Residential development north of the site is less concentrated. There is also a higher-density neighborhood located southeast of the site, in Schram City.



Residential Land Uses

Surrounding Community Resources

The Eagle Zinc site is located within two miles of multiple community resources, including Hillsboro's downtown district, junior and senior high schools, and the Hillsboro Area Hospital. City parks are located southwest of the site, including Chalacombe Park, which includes a community center and Central Park, which has a skateboard park, batting cages, and miniature golf. North of the site, the Hillsboro Sports Complex includes baseball diamonds, soccer fields, and lighted tennis courts. Lake Hillsboro is one of the two lakes in the city. Lake facilities include campgrounds and boating and swimming areas.



Agricultural Land Uses

Wooded Open Space

Hillsboro Parks and Recreation

1 County Courthouse
2 City Hall and Police Dept.
3 Historic Solomon Harkey House
4 Wastewater Treatment Plant
5 Hillsboro Elementary School
6 Hillsboro Jr. and Sr. High School
7 Hillsboro Area Hospital
8 Central Park
9 Challacombe Park
10 Hillsboro Sports Complex
11 Hillsboro Country Club
12 Lake Hillsboro Recreation Area

Eagle Zinc Superfund Alternative Site: *A 90+ Year History*

1914
Lanyon Zinc Company develops the site and begins zinc smelting operations

1919
Eagle-Picher Industries purchases the site and continues zinc smelting operations

1935
Zinc smelting and sulfuric acid production shifts to zinc oxide and leaded zinc oxide manufacturing

1958
Leaded zinc oxide manufacturing ends due to federal restrictions on lead-based paints

1980s

1980 Sherwin-Williams purchases the site.

Zinc oxide manufacturing begins use of zinc feedstock and anthracite coal

1981 Illinois EPA (IEPA) officially discovers the site and lists the site as a 'Discovery Action'

1984 Eagle Zinc Company, a division of T.L. Diamond Company, purchases the site

IEPA conducts a CERCLA preliminary assessment

1990s

1993 IEPA expands CERCLA site inspection

1998 IEPA removes underground storage tank (UST)

Eagle Zinc Company enters into interim consent order with IEPA

2000 - 2006

2001 Site PRPs enter into an Administrative Order on Consent (AOC) with EPA for completion of the site's Remedial Investigation / Feastibility Study (RI/FS)

2002 The Agency for Toxic Substances and Disease Registry (ATSDR) conducts a Human Health and Risk Assessment

2003 Manufacturing operations at the Eagle Zinc site formally end

Phase I and II Technical Memorandums of the RI/FS published

2004 The 1998 UST removal receives a No Further Remediation (NFR) letter

EPA conducts an Ecological Risk Screening Evaluation

2005 EPA conducts a buildings and site inspection

Eagle Zinc Superfund Alternative Site: *Site Background*

History of Operations at the Eagle Zinc Site

The Lanyon Zinc Company initiated operations at the Eagle Zinc site in 1910 (see historical map from 1923 on page 16). Over the course of 91 years, smelting operations produced zinc metal, zinc oxide, and lead pigment from lead ores. Lead-related smelting activities ceased in the 1970s in conjunction with federal restrictions on lead-based residential paints. Sherwin-Williams purchased and operated the facility from 1980 to 1984 and then sold the site to the Eagle Zinc Company, a division of T.L. Diamond Company. These operations officially ended in 2003 (see current layout map on page 17.)

Illinois and US EPA Site Investigations and Remedial Activities

In 1973, an Illinois EPA (IEPA) site inspection revealed that scrap metal, furnace residue, and metal-bearing material containing zinc were stored in the ground. Official site discovery and entry into EPA's contaminated sites' database occurred in June 1981. IEPA conducted surface water sampling and determined that elevated levels of zinc, cadmium, iron, lead, and copper were migrating off-site. Sherwin-Williams then removed approximately 36 million pounds of furnace wastes containing zinc silicates, zinc ferrites, iron silicates, and other types of residue that covered approximately 10 acres of the site.

Soil, process waste, and sediment sample analysis conducted by IEPA in 1993 revealed that manganese found in soil on residential properties surrounding the site exceeded public health guidelines for children's soil exposure. In September 1994, EPA determined that the site did not require a time-critical or a non-time-critical removal action.

In accordance with a court order, the Eagle Zinc Company installed groundwater monitoring wells in the late 1990s. Sample collection began in 1998. IEPA collected stormwater samples from the intermittent stream that drains the northeast portion of the site and from the discharge channel of the site's southwest pond. On-site residue sampling conducted in May 1998 yielded high concentrations of lead and cadmium as well as low levels of PCBs.

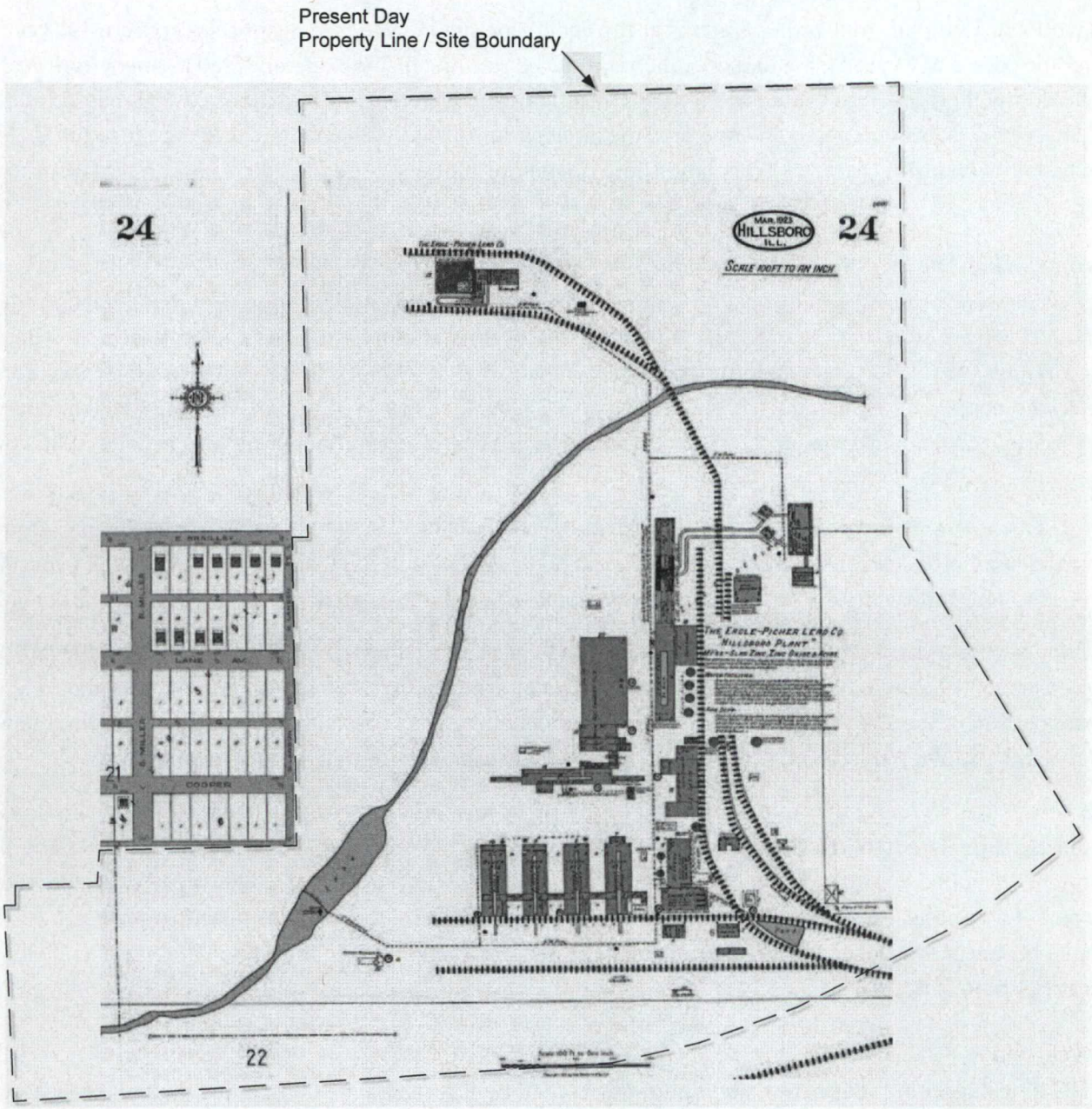
A 1993 determination found that the closest well to the site is located 0.5 miles away, outside of city limits was not impacted by site-related chemicals due to the well's depth and the soil's clay composition. In 2002, the Illinois Department of Public Health documented in its *Health Consultation* report that while processing and smelting primary ores for zinc and lead, and fueling furnaces with coal resulted in accumulation of metals in on-site soil, waste, and sediments, review of available data and information indicated that current site conditions did not pose a public health hazard to Hillsboro residents.

Site Ownership

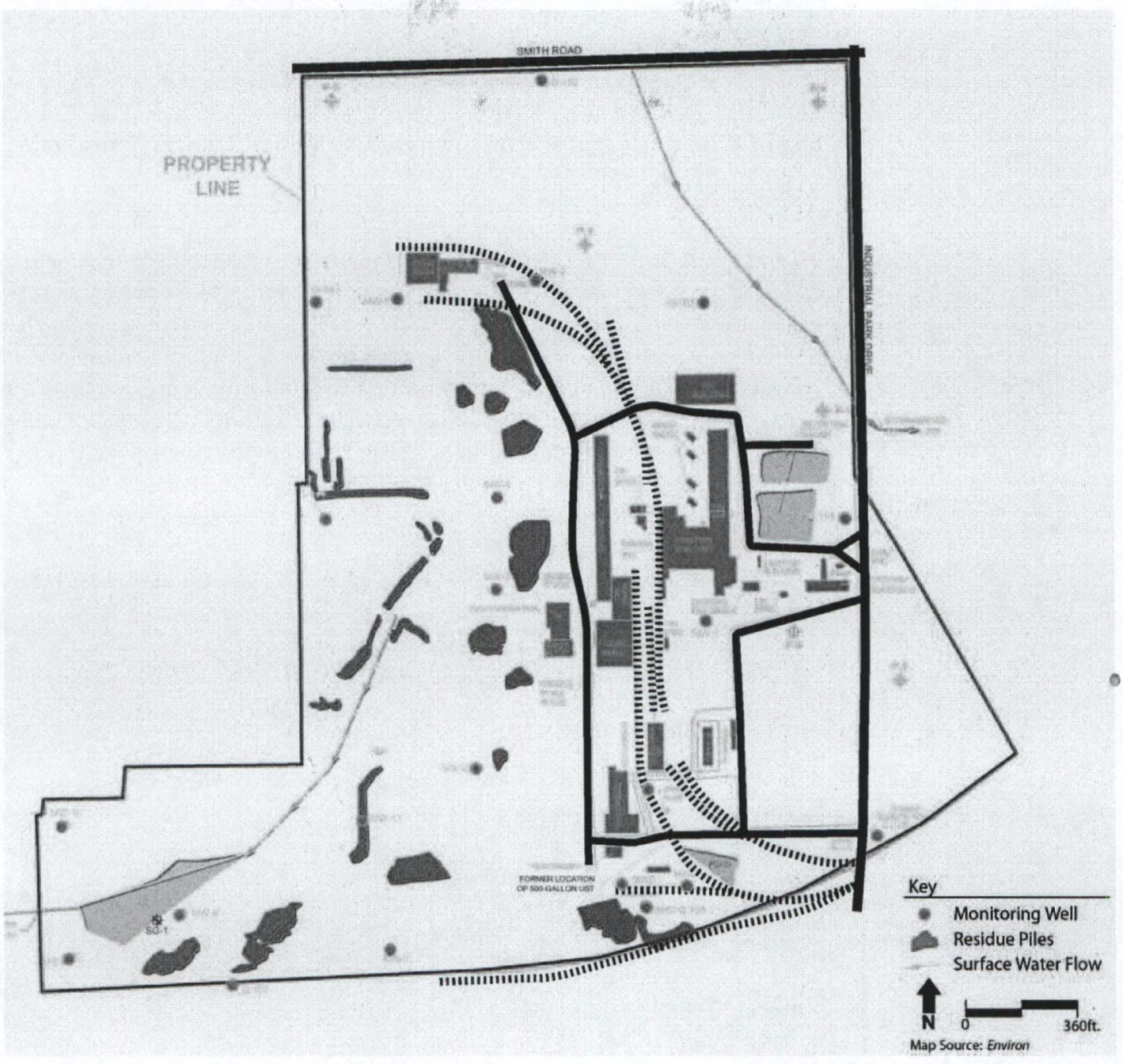
The Eagle Zinc Superfund Alternative site is currently owned by the Eagle Zinc Company, a division of T.L. Diamond Company.

Current Site Status

The site, considered as one single operable unit (OU), is currently listed as a Superfund Alternative site and is not listed on EPA's National Priorities List (NPL) of contaminated sites. The site's potentially responsible parties (PRPs) began funding the site's Remedial Investigation and Feasibility Study (RI/FS) in December 2001. A building inspection was completed in September 2005. Negotiations between the City of Hillsboro and the site's PRPs to address the site's remediation and future ownership are ongoing.



Above: Historical Sanborn fire insurance map from 1923, twelve years after the Lanyon Zinc Company initiated zinc smelting operations. Note the location of rail spurs, buildings, streams, and ponds.



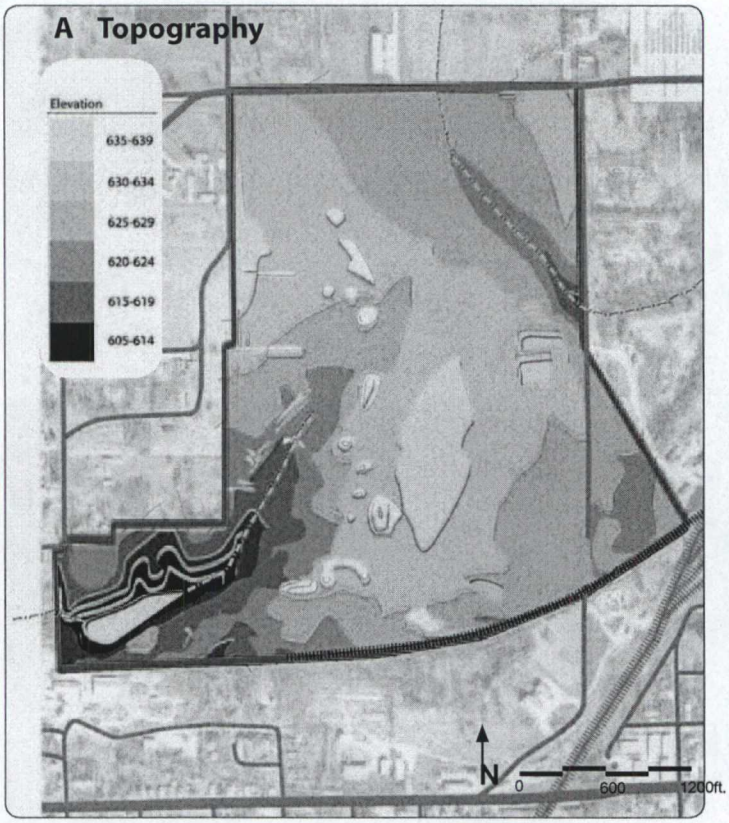
Above: The layout of the Eagle Zinc site as the site exists today. Note the removal of rail spurs and buildings over time, the changes in stream flow and ponds, and the placement of roads and residue piles.

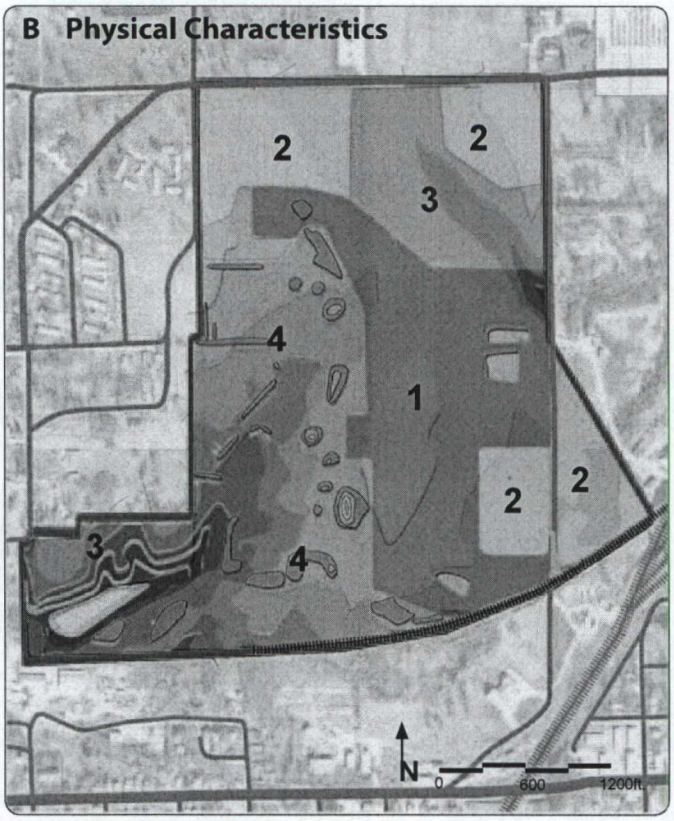
Eagle Zinc Superfund Alternative Site Reuse Overlay Analysis

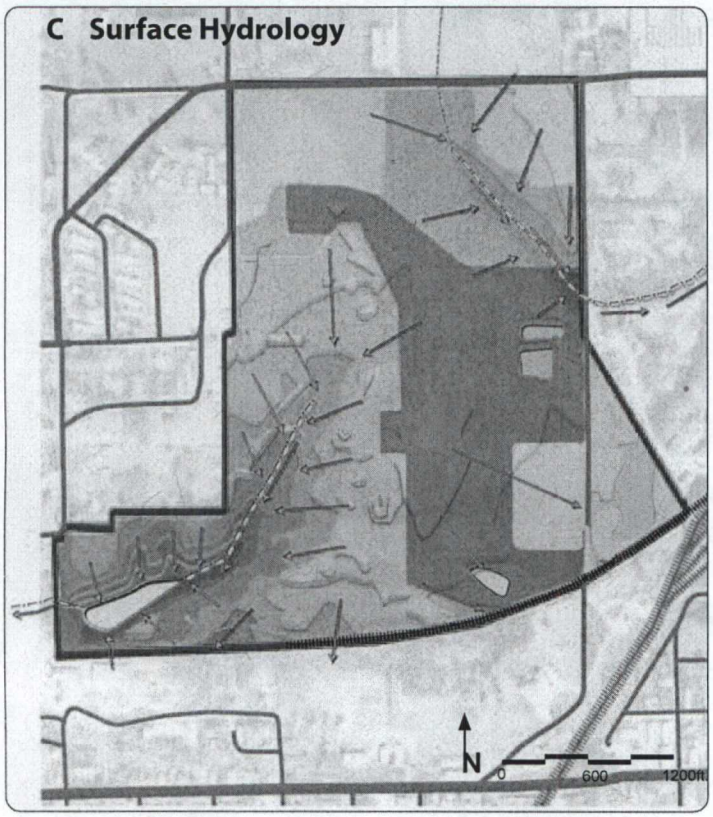
Overview

In February 2005, the City of Hillsboro developed a site reuse strategy that focuses on industrial redevelopment of the site. The project's future reuse overlay analysis examines the site's existing natural and built characteristics overlaid with the site's current industrial reuse strategy. The analysis reviews the industrial reuse plan in light of the site's existing conditions and potential for industrial reuse over time. The overlay analysis also identifies potential obstacles to future site reuses, including the on-site buildings, residue piles, and existing stormwater management issues, and offers potential approaches to address these issues. The overarching goal of the future use overlay analysis is to enhance the City of Hillsboro's efforts to plan for the future use of the Eagle Zinc site.

Existing Site Conditions at the Eagle Zinc Superfund Alternative Site:







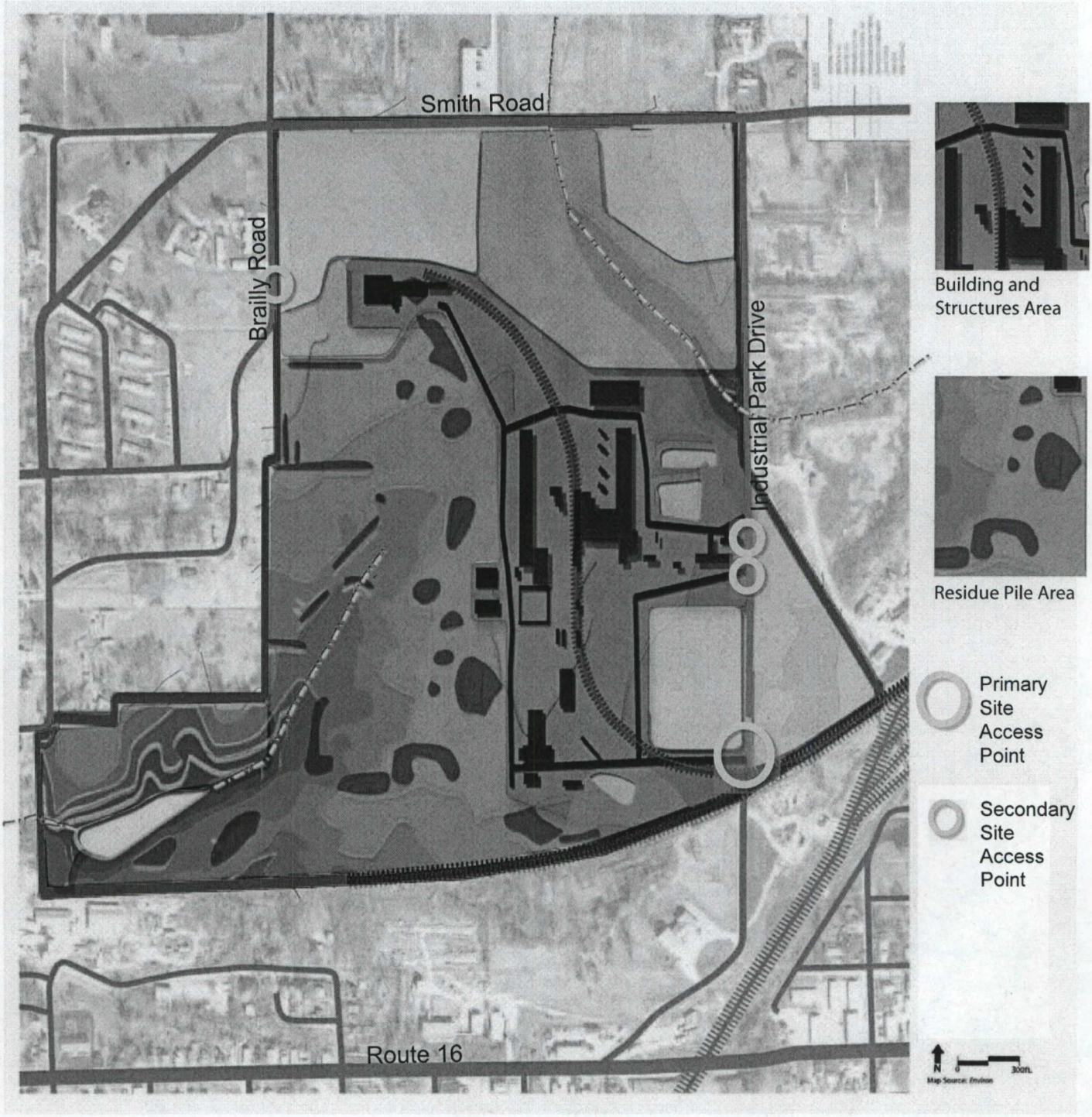
A Site Topography

B Physical Characteristics
- 1 Upland Building Zone *(dark brown)*
- 2 Upland Fields *(light yellow)*
- 3 Woodlands *(green)*
- 4 Residue Pile Area *(medium brown)*

C Surface Hydrology
- Arrows indicated surface water flow towards streams and retention ponds

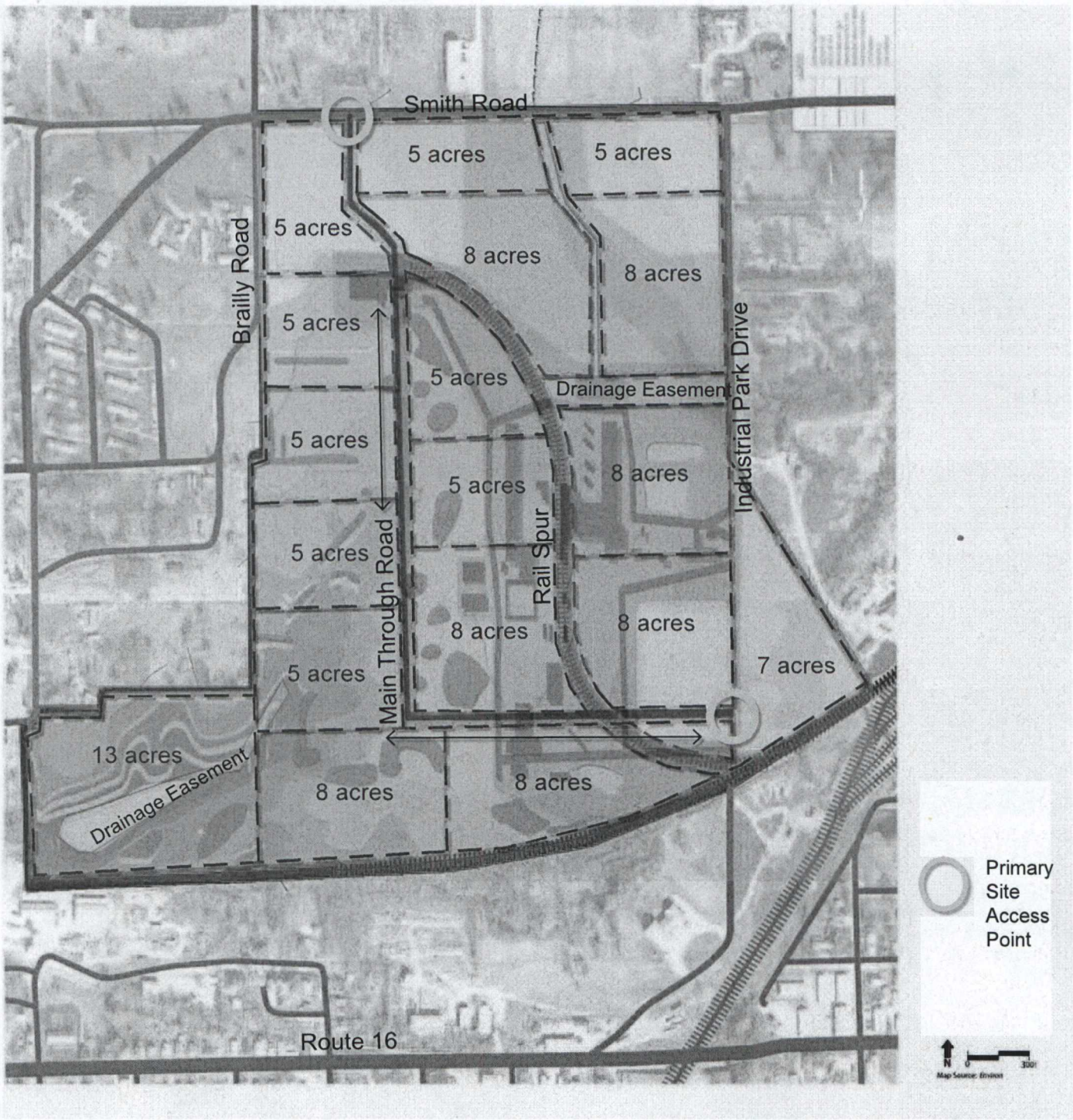
Existing Site Conditions at the Eagle Zinc Superfund Alternative Site:

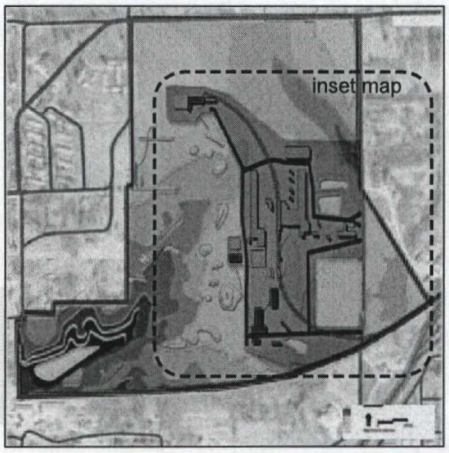
This composite map shows the location of building structures on the site as well as the location of the remnant residue piles. Key existing access points are also hightlighted.



Industrial Site Strategy Overlay

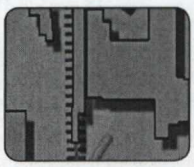
In February 2005, the City of Hillsboro commissioned a local engineering firm to plat Eagle Zinc site, which resulted in the industrial site plan below. In this plan, the 144-acre site is divided into eighteen parcels with nine 5-acre lots, one seven-acre lot, seven eight-acre lots, and one thirteen-acre lot. The proposed main through road begins on the eastern side of the site, north of the site's existing road, and runs westward through existing buildings, northward through the residue pile area and bisects the northwestern field. Smith Road is the site's northern entry point. The proposed rail spur utilizes the existing rail line.



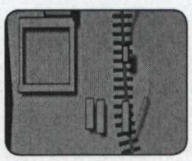


Remaining On-Site Structures at the Former Eagle Zinc Smelting Facility Area:

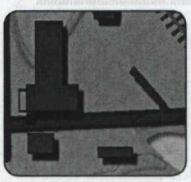
The former smelting area at the Eagle Zinc site consists of approximately 23 remaining building structures as well as concrete pads, ramps, and holding tanks. Building materials on the site include tin, brick, steel, glass, and concrete block. Locations of these materials are presented in the site diagram below.



Metal Structures (tin, steel, etc.) in Blue

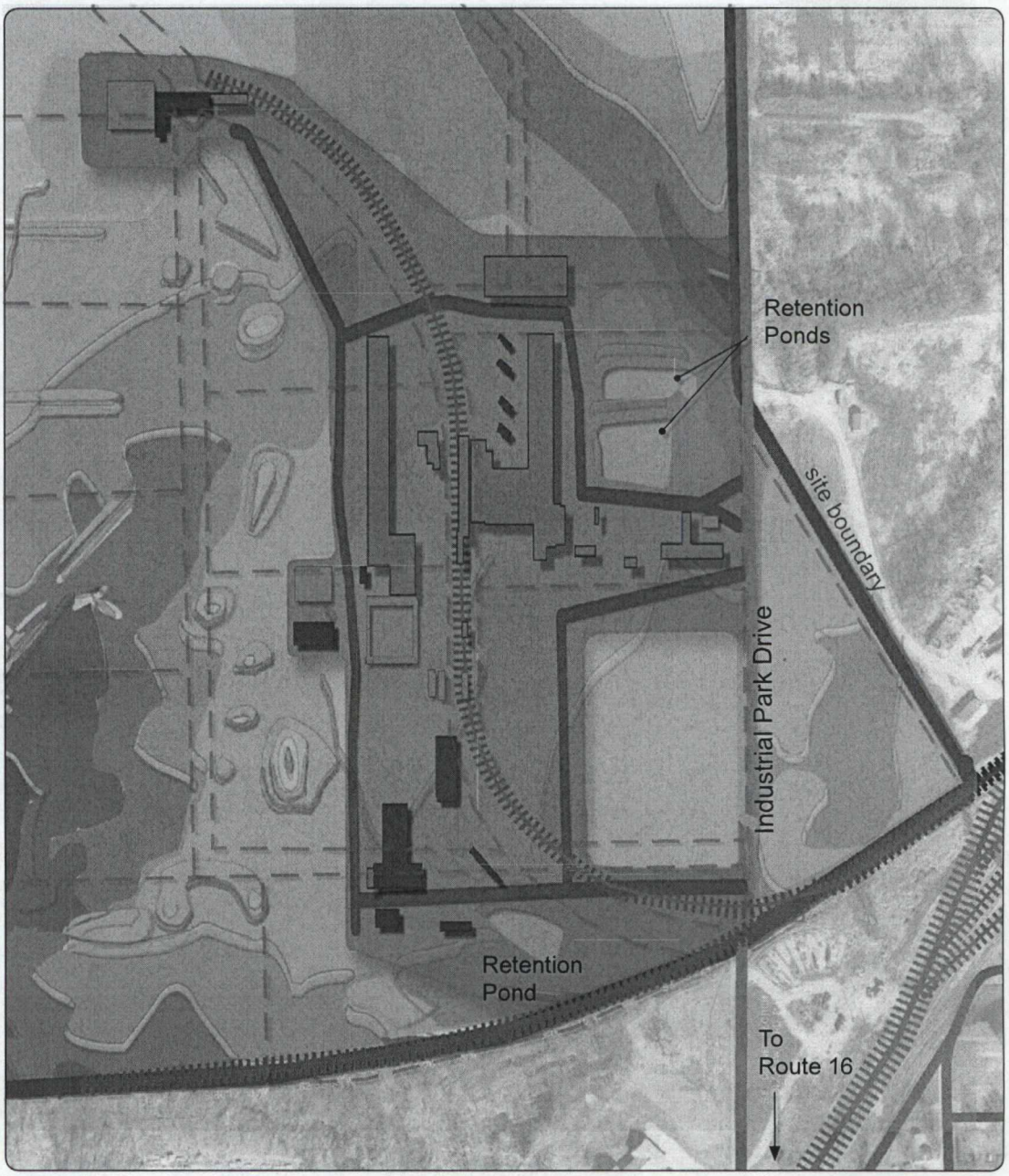


Concrete Structures in Yellow



Brick Structures in Red

Proposed Lot Line



Key Building Issues and Potential Opportunities at the Eagle Zinc Site:

Issues

• Approximately 23 buildings remain on the Eagle Zinc site. Many of the buildings may be contaminated with zinc smelting related residue. While the 2005 Site Inspection report addressed remnant materials within existing on-site buildings, it remains to be determined whether the buildings are contaminated with zinc residues.

Potential Opportunities

• There is an opportunity to generate revenue, reduce landfill input, and create jobs if **deconstruction and recycling** were the methods selected for building removal at the Eagle Zinc site. (See advantages and disadvantages of building demolition and deconstruction below.)

• Existing structures and infrastructure, including concrete slabs, buildings materials, and roadways, could potentially be adapted and recycled for future use.

Demolition: advantages, disadvantages, & major steps

Demolition is the complete destruction and bulldozing of a structure. The building materials and contents are then landfilled.

Advantages

- Quickest way to open space
- Requires the least effort

Disadvantages

- Public benefits may not be maximized
- High costs of demolition and landfill fees
- Salvageable materials are landfilled
- Noise and dust issues

Major Steps

- Bid out and award demolition contract
- Perform contamination inspection
- Demolish building(s)

Deconstruction and Recycling of Building Materials: advantages, disadvantages, & major steps

Deconstruction is the strategic disassembly of a structure (construction in reverse) in order to retrieve all or portions of salvageable materials, such as building materials, roof, and foundation for recycling and/or reuse.

Advantages

- Building materials are recycled
- Demolition and landfill costs are saved
- Landfilling of demolition waste is significantly reduced
- Large-scale deconstruction projects (which require many workers) offer opportunities for job training and welfare-to-work programs

Disadvantages

- Limited demand for recycled building materials
- Labor and time intensive
- Materials and construction techniques used in structures built after 1950 are not ideal for deconstruction
- Specialized worker training may be required

Major Steps

- Determine deconstruction and recycling potential of each building
- Obtain adequate storage space for recycled materials while also soliciting interest from public agencies, non profit organizations, and/or private industries
- Perform contamination inspection
- Obtain necessary permits
- Deconstruct building(s)

Potential Building Materials Recovery, Recycling, and Reuse at the Eagle Zinc Site

Concrete: The most typical reuse for recycled and crushed concrete is as backfill or base for new roads. Concrete can also be crushed and reused as a raw material for new concrete. Crushing equipment can be brought on-site, or recycled material can be carried to a nearby recycling facility

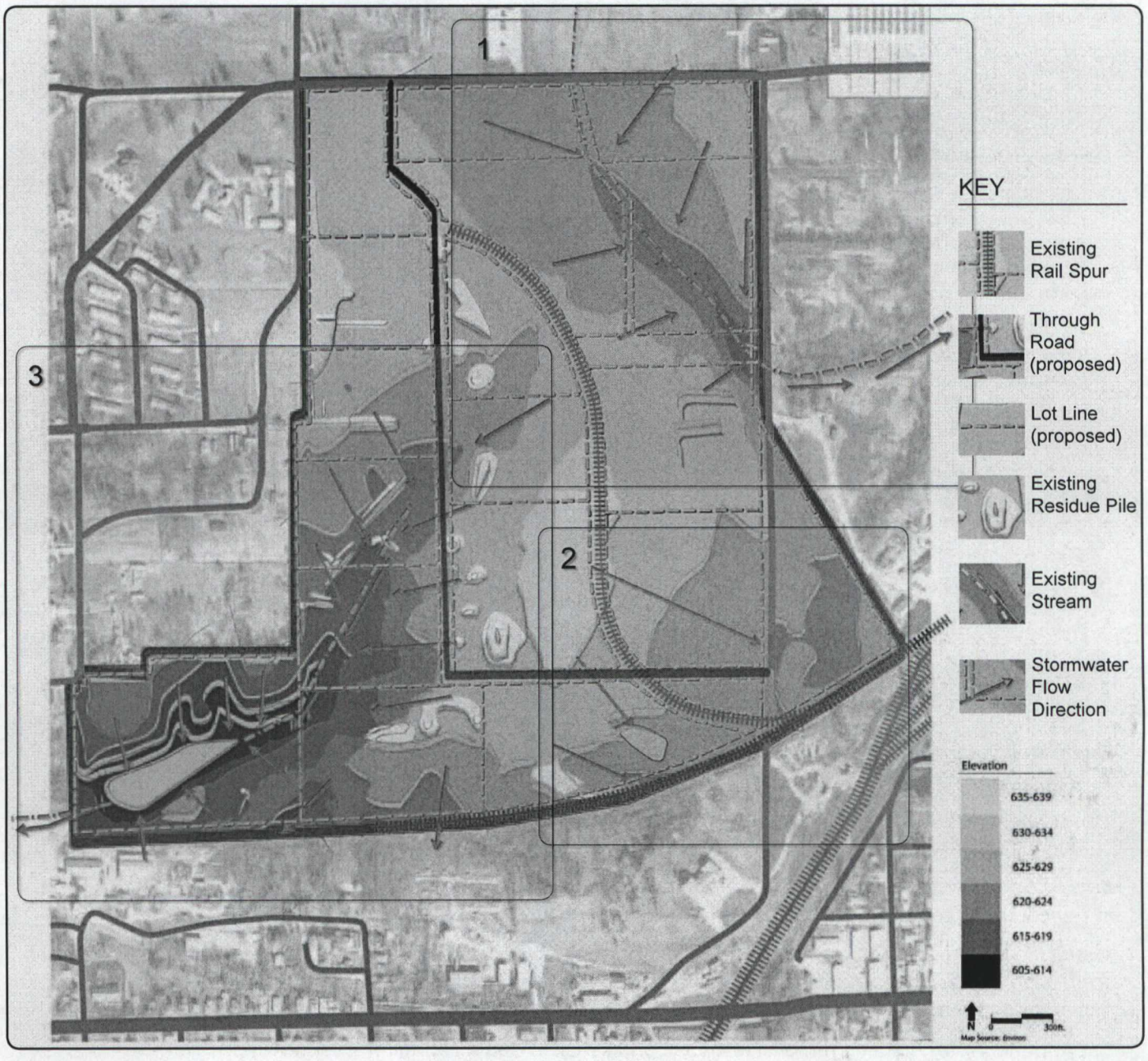
Brick: Bricks recycled from deconstruction sites generally must be whole and suitable for building construction. Imperfect bricks can be crushed and used as backfill.

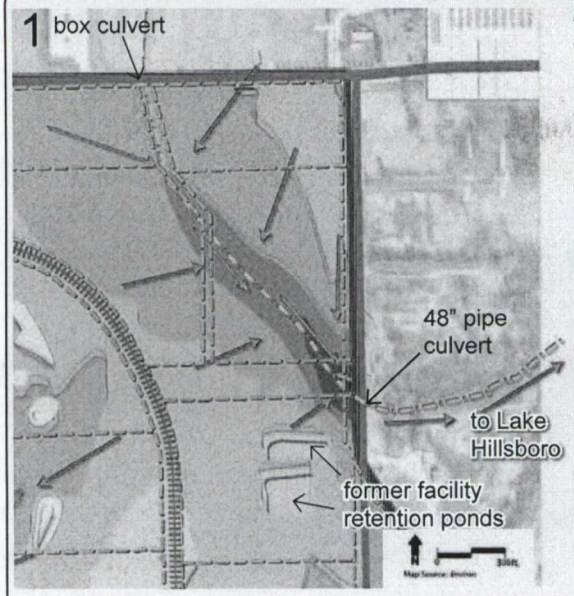
Metals: Metal sheets and pipes, including tin, cast iron, steel, alluminum, and stainless steel can all be sent to scrap recycling facilities where they are melted down and used to produce new products. As metal is recycled, it maintains its strength and integrity so that it be incorporated back into the metal manufacturing process.

See Appendix A for building removal resources and Illinois-based building removal services.

Stormwater Management Issues at the Eagle Zinc Site

The Eagle Zinc site has three primary stormwater collection zones. The first zone, a low wetland area in the site's northeast corner collects water from the northeastern area of the site. The stream in this zone flows from north of the site, across the site's northeast corner, carrying the site's stormwater runoff towards Lake Hillsboro. The second zone, located in the site's southeast corner, is relatively flat and collects less runoff than the other two zones. Stormwater in this zone is collected by a stormwater retention pond. The third zone, which includes the residue pile and a steep sloped area (with 10-15% slopes) located in the southwestern portion of the site, collects the most stormwater run-off, on-site; the entire western area of the site slopes southwestward. A constructed retention pond, approximately 1 acre in size, retains the majority of the water. However, overflow and seepage enters a stream flow that feeds into the Middle Fork Shoal Creek in northwestern Hillsboro. Stormwater runoff in this zone contains metals from the former smelting facility residue piles. Due to a clay layer, groundwater contamination has not been affected at the Eagle Zinc site.



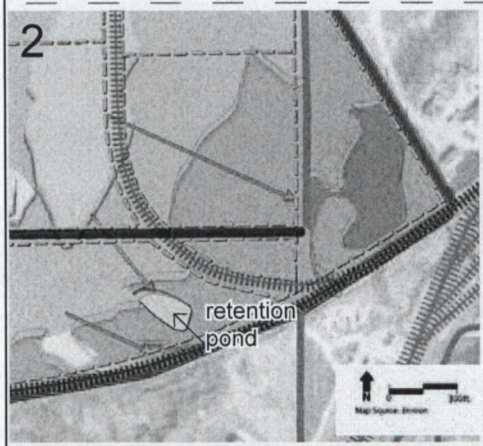


Potential Stormwater and Future Use Issues in Stormwater Area 1

- Clearing of the existing woodland buffer area could present sediment and erosion control issues and would require further considerationof the design of the site grading and BMPs.
- Sediment run-off during construction could enter Lake Hillsboro.
- The clearing of the woodland buffer could potentially reduce wildlife habitat in this part of the site.

Opportunities

- Retention of the woodland buffer area could provide a natural amenity for both site users and wildlife. If future use considerations will likely require the removal of the woodland buffer area, selective tree removal and landscaping could provide an opportunity to retain a portion of the area's existing landscape and minimize stormwater management and erosion issues.
- Parking facilities in this area of the site could use Low-Impact Design techniques to help manage stormwater runoff flows.
- Low-Impact Design stormwater management techniques like check dams could be considered as industrial park amenities for users and community residents.

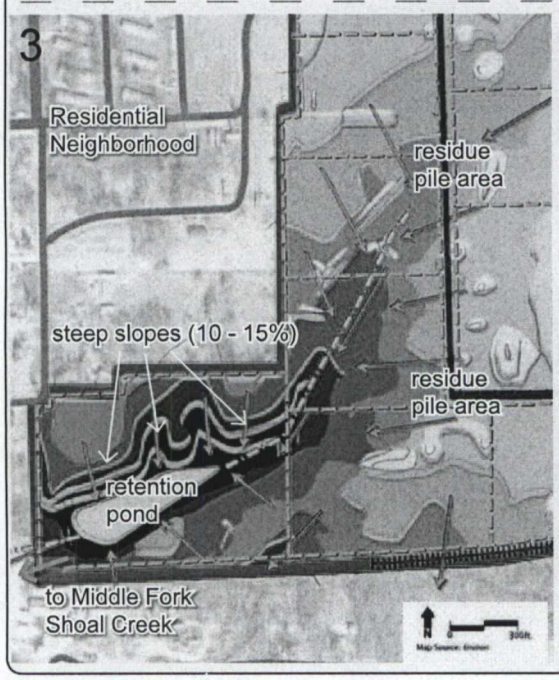


Potential Stormwater and Future Use Issues in Stormwater Area 2

- Clearing of the woodland area around the stormwater retention pond could create overflows and associated erosion and sediment control issues.
- The predominately flat area may require considerations of erosion control stormwater BMPs like erosion control hay bales and fencing.

Opportunities

- Primary access to the site from Industrial Park Road could include reuse of the site's existing entry road, rather than construction of a new road, to minimize erosion and sediment control issues.
- Parking facilities and roadway development in this area of the site could use Low-Impact Design techniques.



Potential Stormwater and Future Use Issues in Stormwater Area 3

- Until the site's residue piles are remediated, stormwater runoff wil carry metals from the residue piles into the retention pond in the site's southwest corner.
- If the western half of the site is built out as planned, the retention pond's holding area and its potential resizing would need to be considered as part of the process.
- The Clearing of the woodland buffer in this area could present sediment and erosion control issues and would require further consideration of the site grading and BMPs.
- Slopes (10-15%) in the southwest corner would require steep slope design considerations and potentially significant site engineering and grading.

Opportunities

- Innovative remedial technologies offer an opportunity to address residue pile runoff in this area, while the area's steep slopes and existing woodlands suggest that passive recreational reuses like a trail system could minimize stormwater concerns.

A Revised Site Reuse Strategy:

The Conceptual Reuse and Long-term Stewardship Framework

Introduction:

The conceptual reuse and long-term stewardship framework highlights areas of the site that could offer opportunities to build both economic and community resources for the City of Hillsboro. The framework is a flexible plan based on the site's existing physical conditions and based on historical uses of the site. The resulting strategy is called a "framework" because it represents an early plan, a flexible structure able to incorporate additional detail and information over time.

Building on the City's 2005 site plan, potential future use opportunities include the industrial reuse of the site's upland areas as well as the enhancing the site's ecological and passive recreational resources so that the site can serve multiple community needs and serve as an amenity for surrounding neighborhoods, linking local residents, visitors, and wildlife through trails and habitat restoration. The framework also addresses potential on-site stormwater challenges by highlighting opportunities to constuct parking areas using Low-Impact Design techniques and the use of the site's low-lying wetland areas as a managed stormwater park space.

The various components of the framework are described on subsequent pages of the report.

Goals and Guidelines:

Based on community interviews, a 2005 site and community visit, and review of site-related materials, the project's consultant team developed a set of guidelines that guided the development of the site's reuse framework:

Maintaining Community Health and Safety:

• The long-term protection of the community's health and safety should be the top priority at the Eagle Zinc site.

Multiple Uses Meeting Multiple Community Needs:

• Reuse of the Eagle Zinc site could include multiple uses, meet multiple community needs, and reflect the character and history of the site and its surroundings.

Providing Potential Economic Development Opportunities:

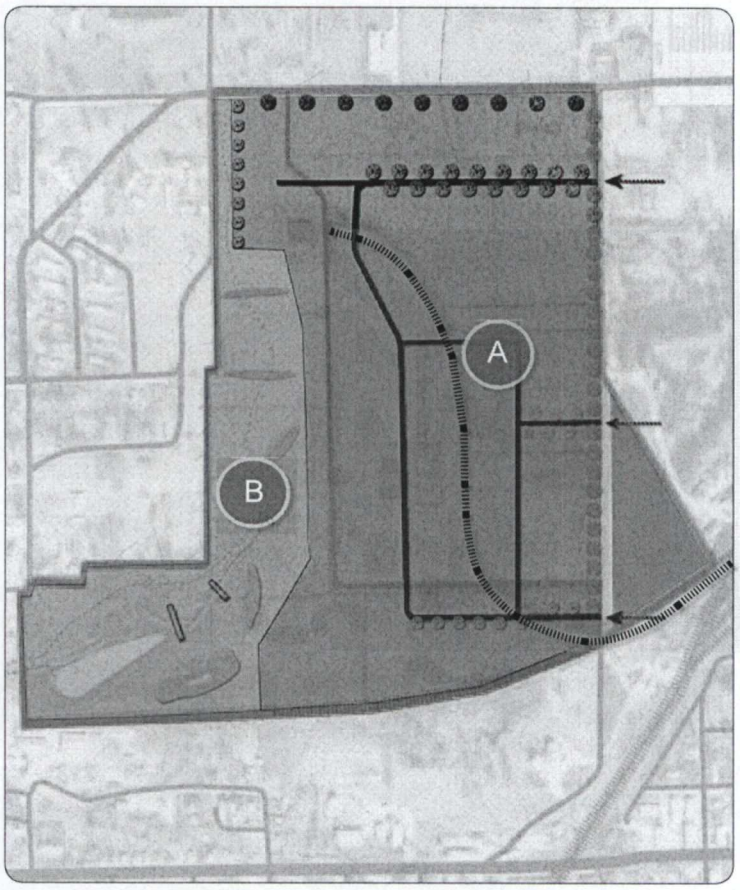
• Remediation and reuse of the Eagle Zinc site could serve as a catalyst for economic development in the City of Hillsboro.

Serving as a Community Amenity:

• Reuse of the Eagle Zinc site could re-integrate the area with surrounding land uses and serve as a neighborhood and city-wide amenity.

Preserving Natural Resources:

• Protected and restored ecological resources, including wetlands, streams, and woodlands at the Eagle Zinc site could serve as stormwater management areas, resources for environmental education, and wildlife habitat.



Scenario 1:

An expanded economic developmer... incorporating the residue piles, either through their removal or the incorporation of the source material into the materials used in the parking pavement and roadbeds or transformation of the source material through vacuum extrusion at elevated temperatures. There is potential for several of the building structures to be restored and adaptively reused.

A ***Economic Development Area*** *(95-100 acres)*

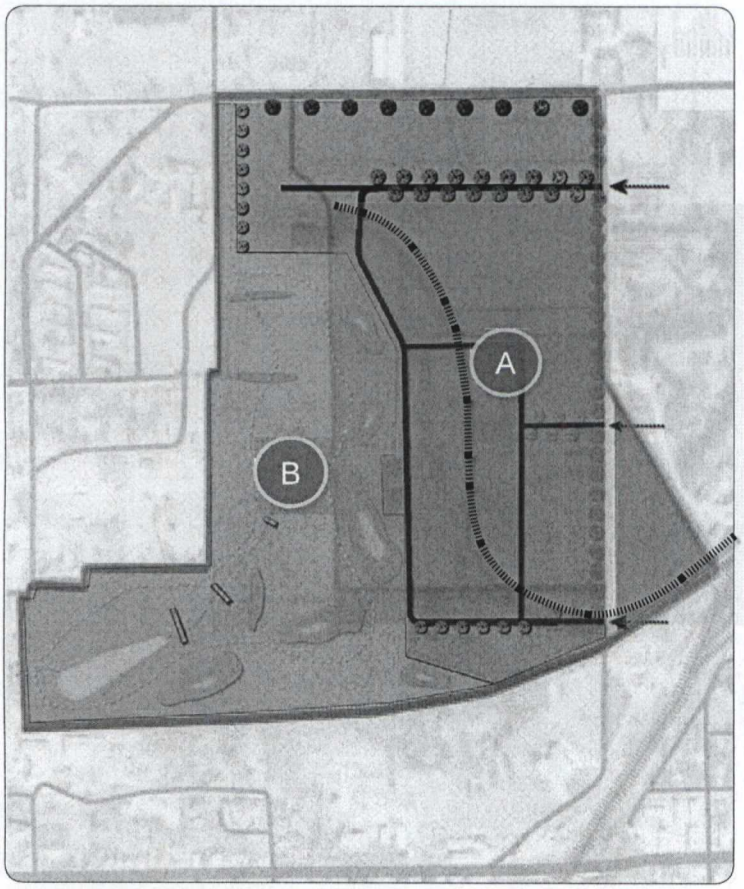
Potential uses in this portion of the site could include:

- Light Industrial Facilities
- Parking Facilities using Low-Impact Design Techniques

B ***Ecological Recreation Area (25-30 acres)***

Potential Uses in this portion of the site could include:

- Outdoor Recreation
- Walking Trails
- Nature Trails for Wildlife Viewing
- Picnic Area and Gathering Space
- Stormwater Management Area



Scenario 2:

An Expanded Ecological Recreation Area, incorporating the residue piles into the design of the recreation area. The residue piles could be remediated in situ using an 'immoblization' remedial technique.

A ***Economic Development Area (80-85 acres)***

Potential Uses in this portion of the site could include:

- Light Industrial Facilities
- Parking Facilities using Low-Impact Design Techniques

B ***Ecological Recreation Area (50-55 acres)***

Potential Uses in this portion of the site could include:

- Outdoor Recreation
- Walking Trails
- Nature Trails for Wildlife Viewing
- Picnic Area and Gathering Space
- Stormwater Management Area
- Environmental Education Kiosks with Interpretive Signage on the History of the Eagle Zinc Site.

Economic Development Area

The framework locates the Economic Development Area on the site's existing flat, upland areas because these areas could be best suited for building construction and also the site's least environmentally sensitive areas. In addition, future developments in these areas could reuse the existing concrete pads and building foundations, adaptively reusing preexisting structures on the site. The fields, located to the north and southeast of the Economic Development Area, could potentially be used for either additional building or parking facility development.

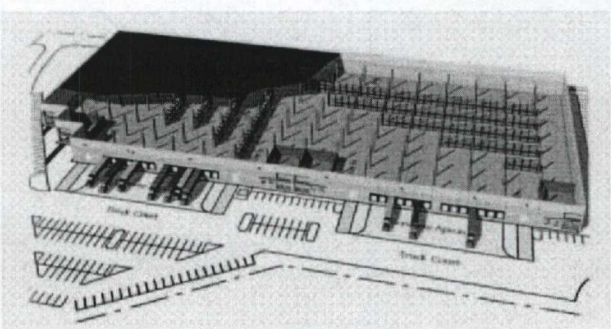
Potential reuses in this area that could fit well with the site's characteristics and surrounding land uses could include light industrial land uses. The city has proposed that the site's central north-south running rail spur is to remain. Particular industries that could be well-suited to the site's size and existing infrastructure as well as blend with surrounding land uses include regional warehousing, bulk warehousing and cluster development, and transloading facilities.

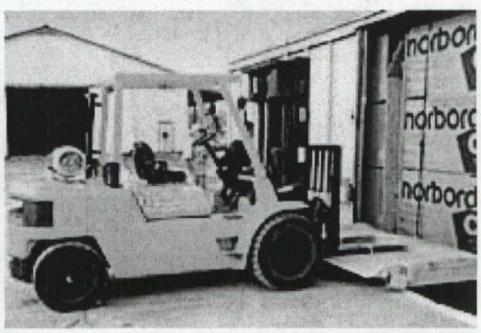
Regional Warehouses store a supply of goods for a particular region. They offer a central storage function for companies, often improving inventory levels while reducing overall operating costs.

Bulk warehouse storage and cluster business development is a group of interconnected companies and institutions in a particular field that are located near each other and are linked by common and/or complementary needs and/or services.

Transloading facilities are facilities that transfer materials between rail, truck, and air carriers. These facilities are often paired with bulk warehouses or other types of storage units.

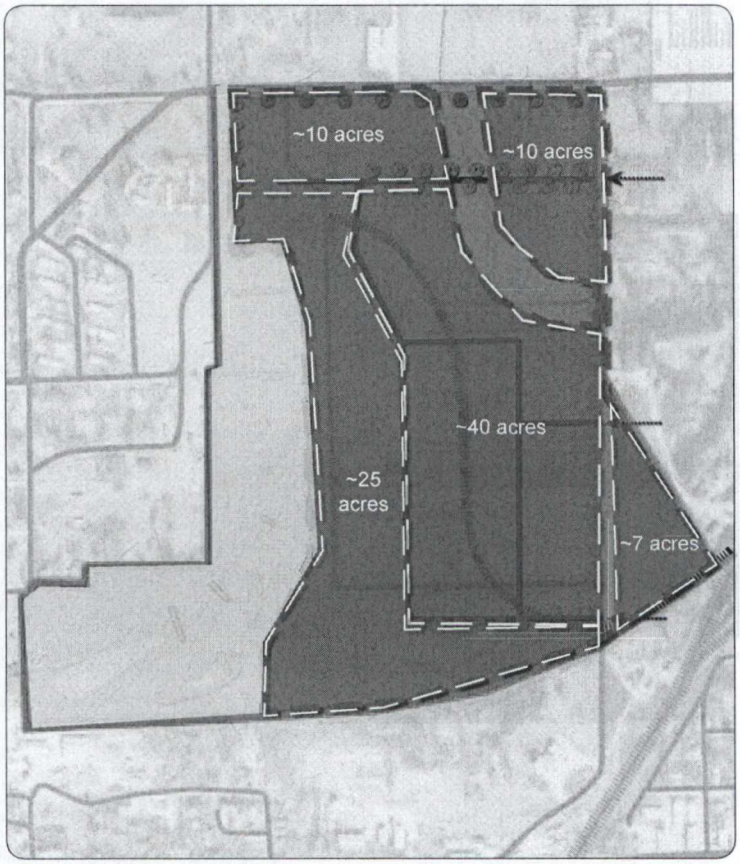
Building Type + Total Acres Required	Building Footprint Square Footage	Parking needs
Regional Warehouse 4-8 acres	100,000 ft²	1-2 spaces/1000ft² 100 – 200 spaces 1 truck dock/5,000-15,000 ft² 7 – 20 truck docks minimum
Bulk Warehouse 4 - 48 acres	100,000–1,000,000 ft²	1-2 spaces/1000ft² 100 – 2000 spaces 1 truck dock/5,000-15,000 ft² 34 – 100 truck docks minimum
Transloading Facility Building footprint: 2 – 20 acres Outdoor Storage Area: 0-200 acres	15,000 – 450,000 ft² 70,000 ft² median size	1-2 spaces/1000ft² 15 – 700 spaces 1 truck dock/5,000-15,000 ft² 5 – 15 truck docks minimum





Left: Computer model of a regional warehouse facility.

Right: Forklift operating at a transloading facility, transferring goods from storehouse to train.



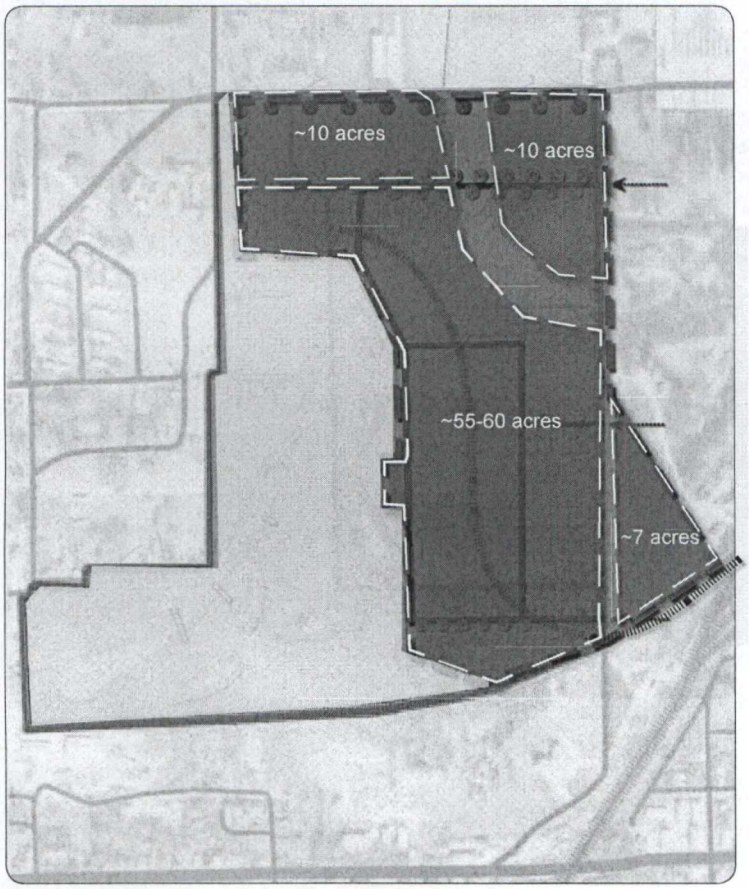
Scenario 1:

Economic Development Area (95-100 acres total)

Potential Uses in this portion of the site could include:

- Light Industrial Facilities
- Parking Facilities using Low-Impact Design Techniques (discussed on page 32-33)

Please refer to the table on page 30 for a review of the types of light industrial facilities and the space required for buildings, truck docks, and associated parking facilities.



Scenario 2:

Economic Development Area (80-85 acres total)

Potential Uses in this portion of the site could include:

- Light Industrial Facilities
- Parking Facilities using Low-Impact Design Techniques (discussed on page 32-33)

Please refer to the table on page 30 for a review of the types of light industrial facilities and the space required for buildings, truck docks, and associated parking facilities.

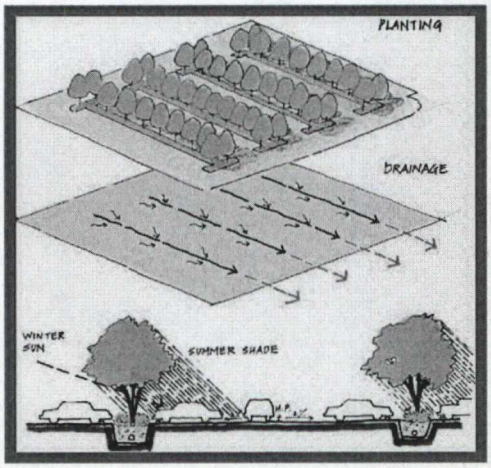
Parking Facilities Designed with Low-Impact Design Techniques for Stormwater Management:

The parking facilities proposed for the northern and southeastern portions of the Economic Development Area could be designed using Low-Impact Design management techniques to help manage site stormwater flows. Potential parking areas are outlined on page 33; these flat, upland areas are currently either fields or residue pile areas.

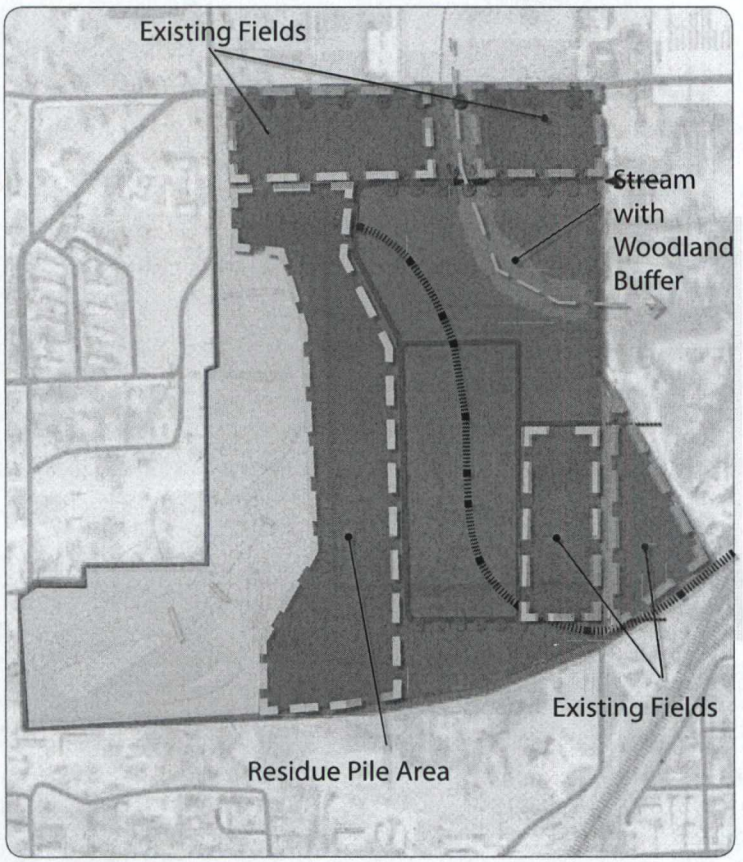
Parking facilities designed with Low Impact Design techniques provide a way to restore local ground water supplies at lower costs than conventional methods of parking lot development. Conventional parking lots seal the earth's surface, forcing stormwater into stormwater systems and streams at a very fast rate, resulting in lost groundwater recharge, depleted groundwater levels, low stream flows, eroded streambanks, and degraded water quality. In contrast, Low Impact Design techniques such as pervious paving and bioretention swales slow stormwater runoff, filter pollutants, and allow water to infiltrate into underlying soil, helping to recharge groundwater supplies.

Sustainable features of Low Impact Design techniques at the site could include limiting conventional pavement and utilizing porous paving or using crushed stone over a vegetative barrier in the parking sleeve area and parking lot area. Placing and planting bio-swales in between lot rows with native plants would help to convey, retain, infiltrate, and cleanse stormwater before it leaves the site. Use of native plants adapted to the area's hydrologic conditions would also improve runoff reduction and provide water quality benefits.

Left: Grassy pavers and gravel parking area, low-impact design techniques used to allow stormwater to percolate through the soil, directly recharging the groundwater supply, rather than quickly running into a stormwater sewer system and local streams. *Source: E² Inc*



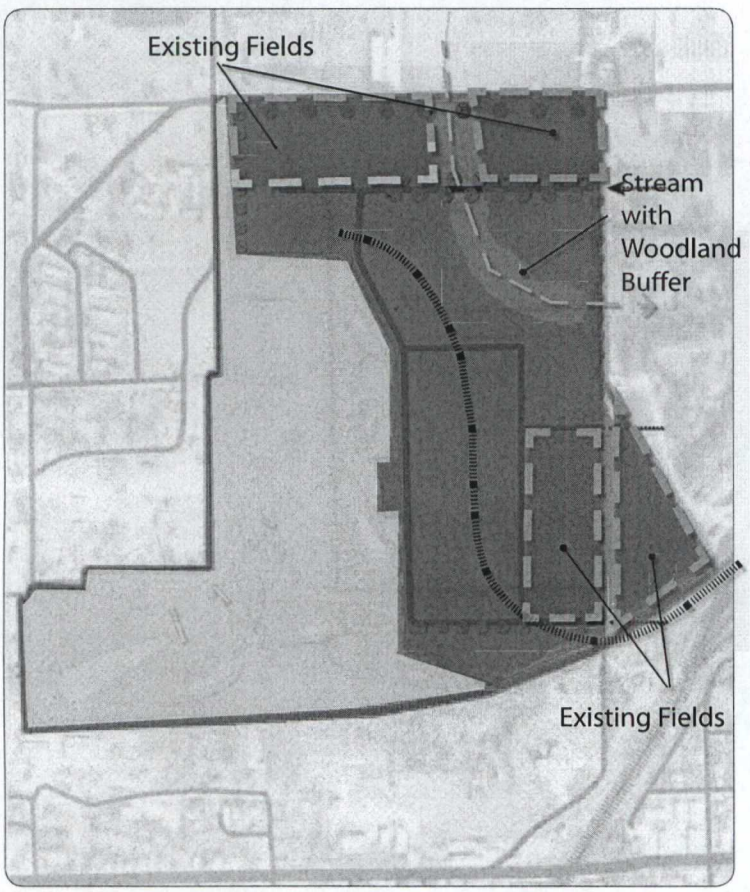
Right and Far Right: Diagram and image of parking facility bio-swales, a low-impact design technique developed to help remediate stormwater runoff. Note several key elements of this parking facility bioswale: the cuts in the curb, native plantings, and a center drain. *Source: E² Inc*



Parking Facility Scenario 1:

Within the expanded economic development area, parking could be located along the northern, eastern, and southwestern edges of the site. Residue piles located in these areas would either need to be removed or incorporated as part of the source materials used for parking pavement and roadbeds or adapted through a high temperature extrusion process, creating tiles and block pavers. The highlighted areas show the potential areas where parking facilities could be placed, in the upland field areas and the residue pile area. Consideration of enhanced BMPs would be necessary if parking facilities were placed near the stream with the woodland buffer.

For parking facility requirements for light industrial facilities, refer to the table on page 30.



Parking Facility Scenario 2:

With an expanded ecological recreation area, parking could still be located along the northern and southeastern edges of the site. Consideration of enhanced BMPs would be necessary if parking facilities were placed near the stream with the woodland buffer.

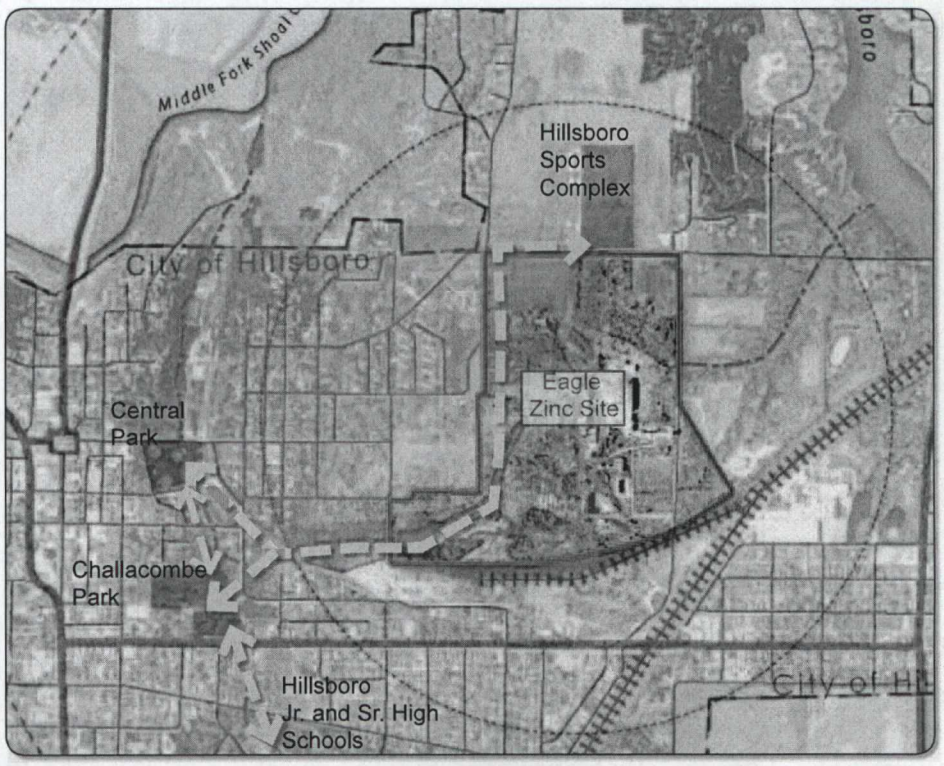
For parking facility requirements for light industrial facilities, refer to the table on page 30.

Potential Ecological Recreation and Stormwater Management Area with Trails Linking Area Neighborhoods and Parks:

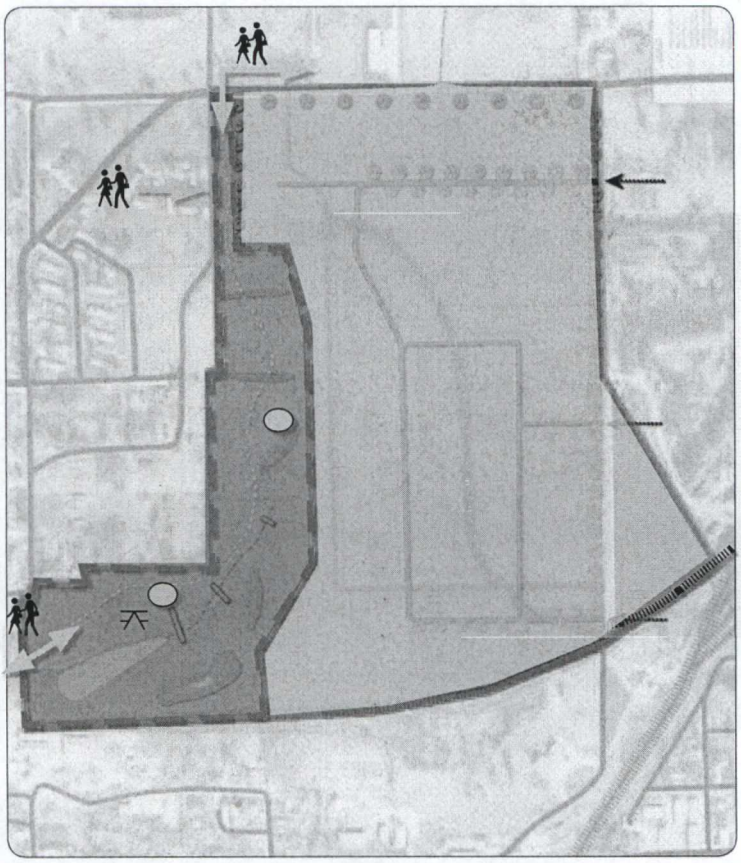
The western portions of the Eagle Zinc site are both environmentally sensitive, including stream drainage and wetland areas, and significantly impacted by remnant residue piles. The area's drainage extends southwestward into the site's stormwater retention pond. Water flow from the pond then flows into a stream channel that leads to Middle Fork Shoal Creek, which borders Hillsboro's western edge. The restoration of this landscape offers an opportunity to create an ecological and passive recreational amenity for site users and the local community as well as area wildlife.

Trails could draw users through the site to view the natural processes, birds, and potentially other wildlife.

Right: Images of potential ecological and recreational opportunities that could take place in the western portion of the Eagle Zinc site.



Right: Map of Hillsboro showing potential trail connections between area parks, schools, and neighborhoods if a trail were developed along the western side of the Eagle Zinc site.



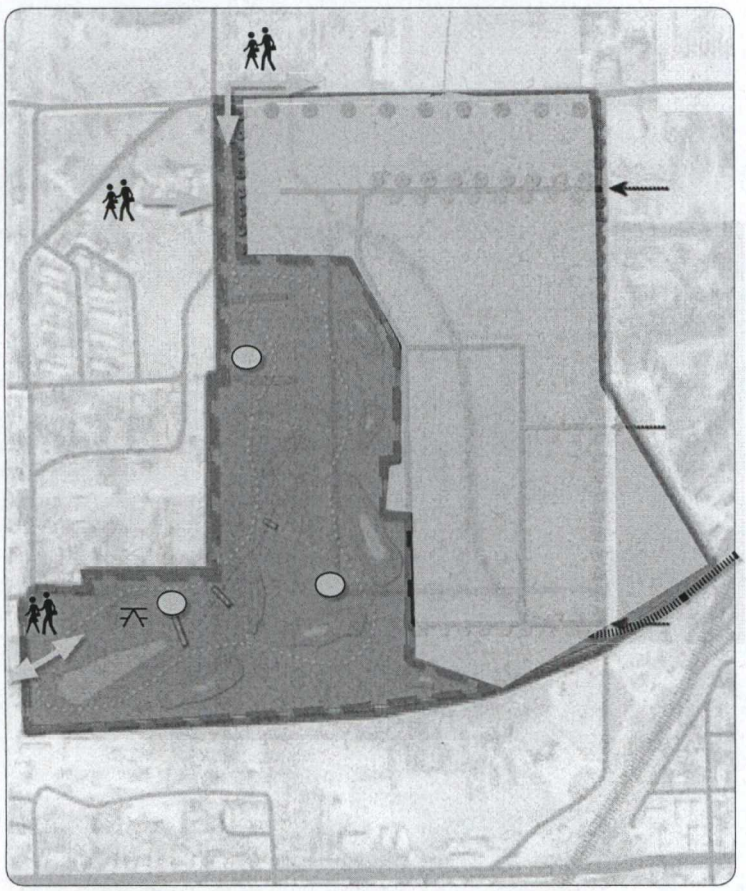
Scenario 1:

Ecological recreation area (25-30 acres)

The western portion of the site could potentially serve as an outdoor recreation and envirnomental education amenity for the community as well as wildlife habitat. Walking and biking trails could potentially connect nearby parks, neighborhoods, and schools, including the Hillsboro Sports Complex, Challacombe Park, Central Park, and Hillsboro Jr. and Sr. High Schools. Interpretive focal points could be placed at strategic locations, giving visitors a sense of the history of the site and an understanding of the environmental and stormwater techniques used at the site.

Trails, Gathering Space, and Interpretive Focal Points

Stormwater management area with pedestrian bridges



Scenario 2:

Expanded Ecological recreation area (50-55 acres)

This scenario is an expanded version of scenario one, with the potential for a network of bicycle and nature trails running throughout the western half of the site.

The drainage area sloping southwestward could also be converted into a formal stormwater management area that collects the surface water runoff from the eastern portion of the site and the water that collects from the neighborhood west of the site.

Trails and Gathering Spaces, and Interpretive Focal Points

Stormwater management area with pedestrian bridges

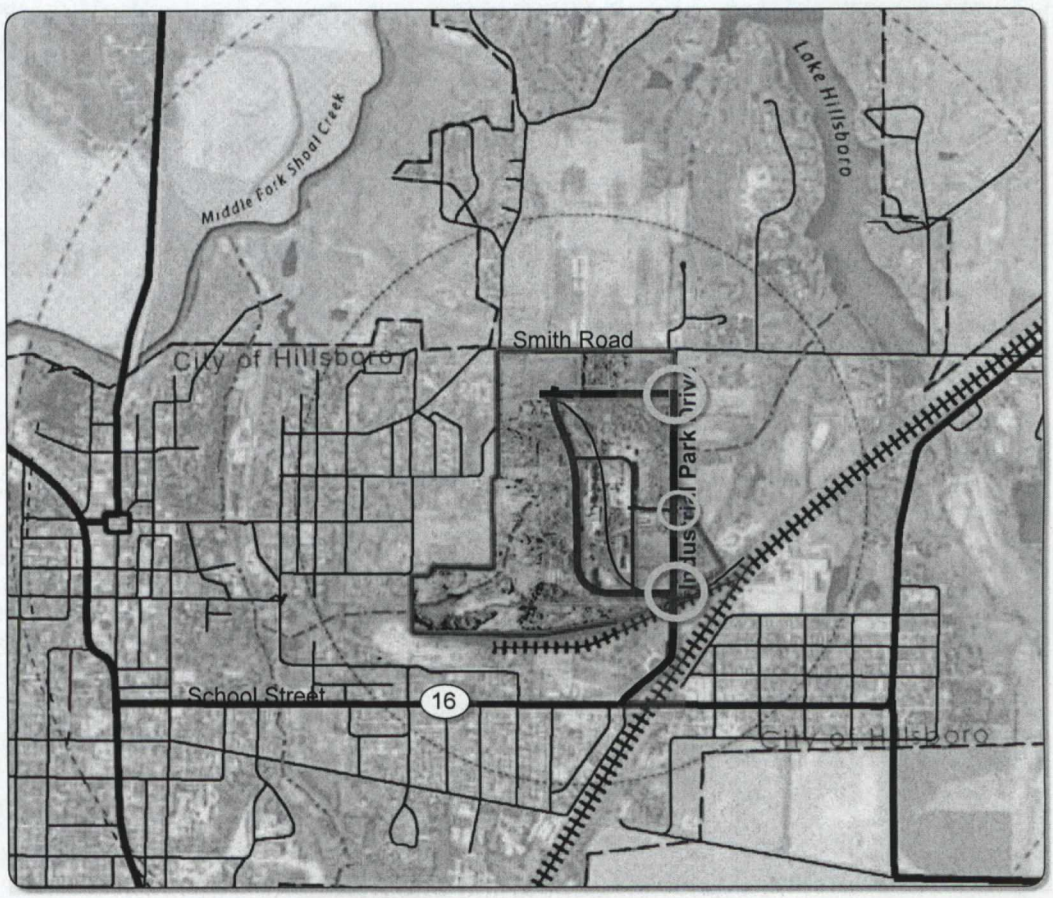
Potential Site Access and Transportation Network Issues and Opportunities

Potential Issues:

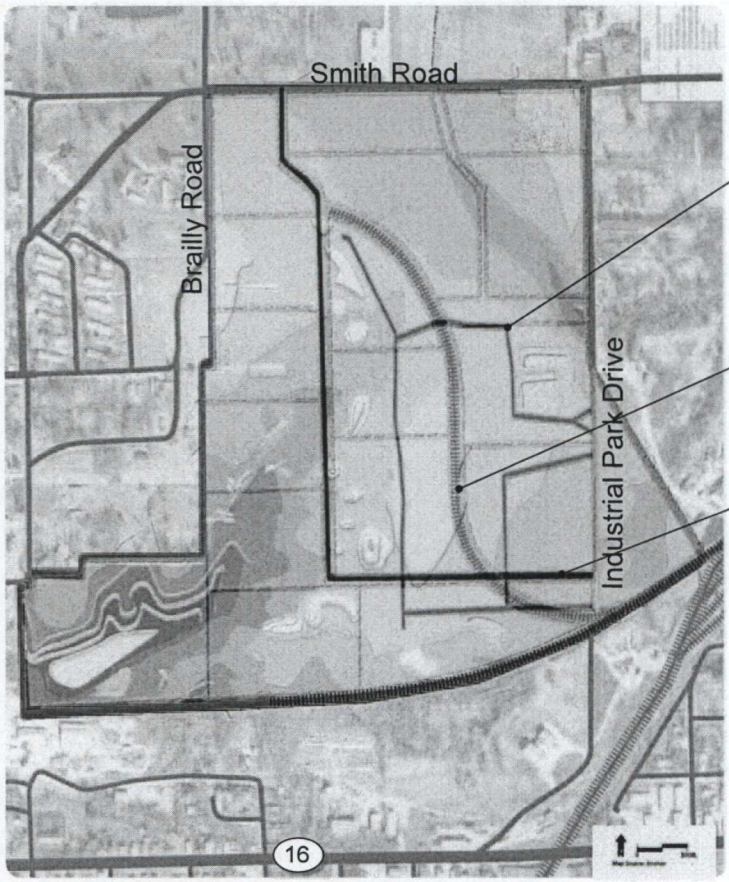
The existing transportation network is located on the upland portion of the site, primarily in the site's southeastern quadrant. Access to the gravel and hard-surfaced roads that form a loop across the site is off of Industrial Park Drive. Access to the proposed industrial site plan's through road is off of Industrial Park Drive and Smith Road, a busy residentially-based road that connects the downtown district with residential neighborhoods and the recreation centers in the Lake Hillsboro area. Industrial use of Smith Road is not recommended to help maintain the residential character of this street. In addition, the through road in the existing industrial plan also does not take advantage of the existing roadways in the Eagle Zinc site. Lastly, the through road in the existing industrial plan does not take into account the potential remedial design of the site.

Potential Opportunities:

There is the opportunity to develop a transportation network on the site that responds to the existing road network, using the existing roadways. This would reduce the impact of development on the stormwater system, could potentially reduce costs of site remediation and future site development. There is also an opportunity to develop a road network that uses the Industrial Park Drive as its main entry and exit roadway. State Highway 16 would be the primary industrial access road while Smith Road would only be used for employee and visitor traffic.



Right: Map of Hillsboro showing the potential layout of the site's primary and secondary roads and rail spur.

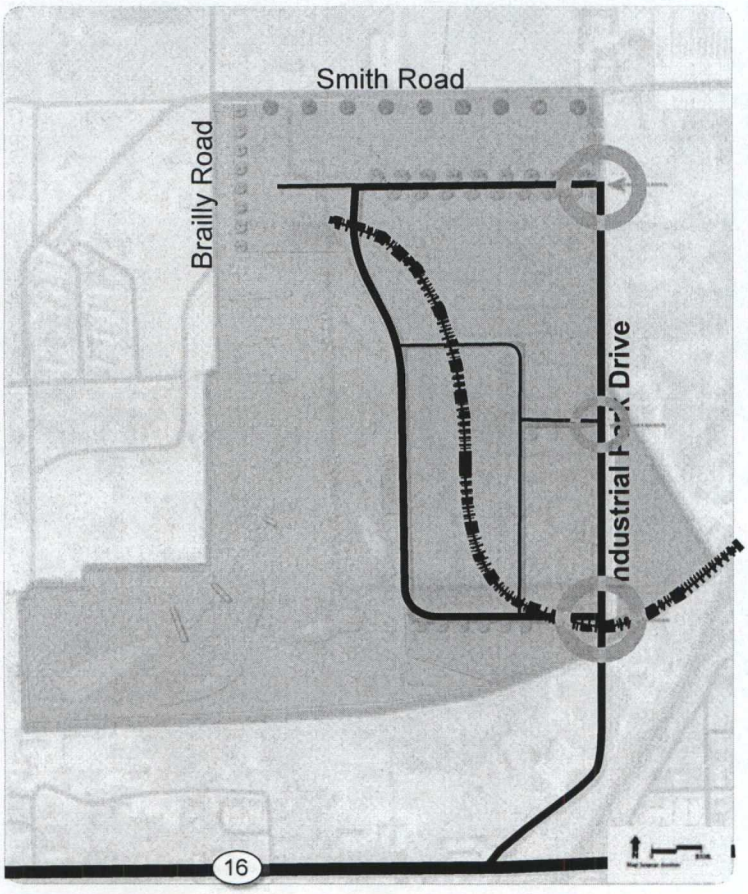


Existing and Proposed Industrial Site Plan Transportation Network and Site Access

The *existing road network* (in dark blue) is located on the upland portion of the site, in the southeastern quadrant. *Existing primary access points* are on Industrial Park Drive. A secondary entrance is located in the northwest corner of the site on Brailly Road.

The *existing rail spur* will remain for future uses at the site.

The *proposed primary through road* (in black) for the site. Accesss is on Industrial Park Drive and Smith Road.



Potential Alternative Road Layout and Site Access

The existing primary access point and roads of the Eagle Zinc site are incorporated into design. An additional entry point is located in the northeastern area of the site to help to facilitate traffic flow and allow vehicular access to the entire buildable areas of the site. Access to the site is along Industrial Park Drive, which would allow Smith Road to remain a residential street., connecting community members and visitors to and from downtown Hillsboro to Lake Hillsboro area neighborhoods and recreation areas.

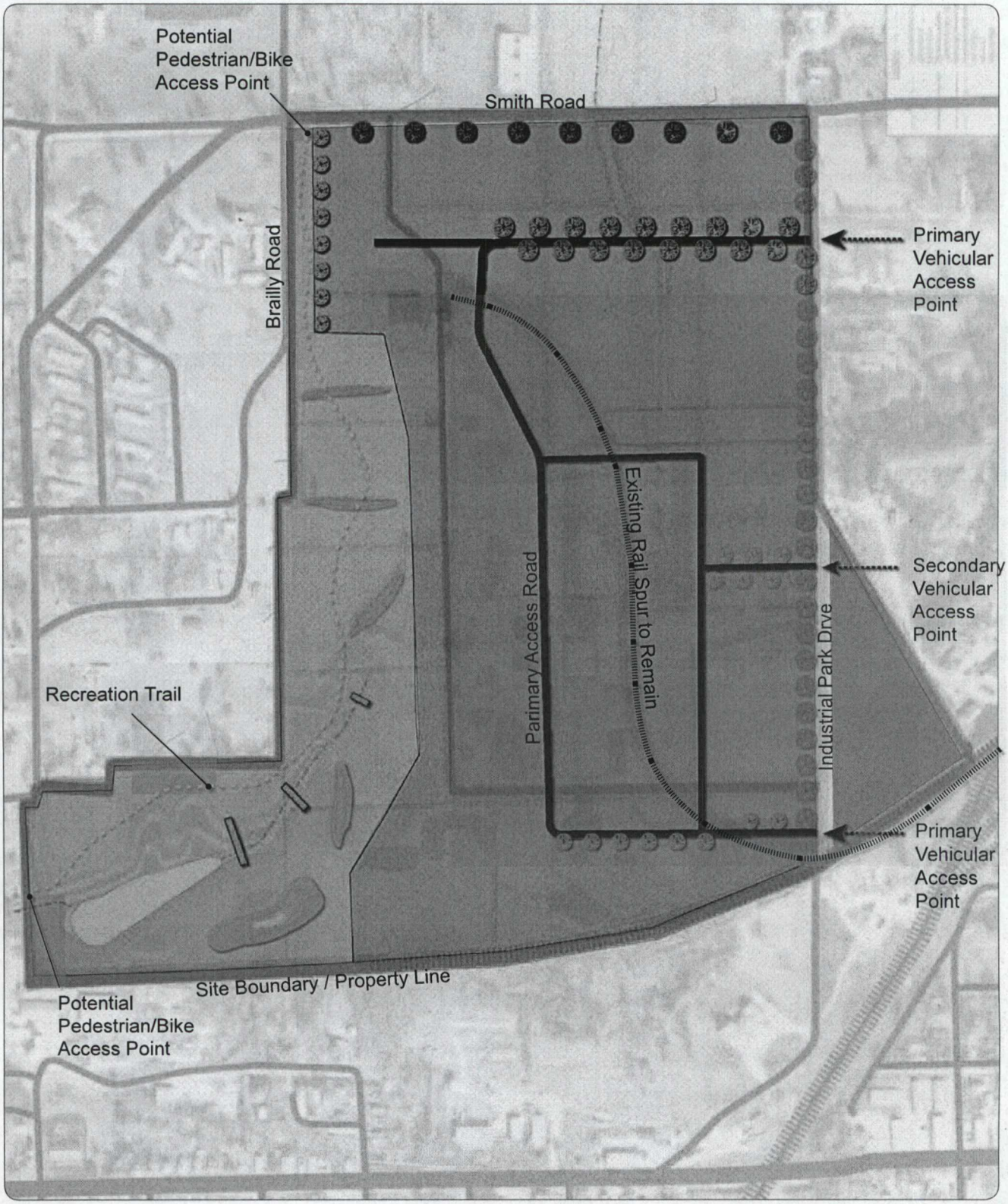
Rail Spur

Primary Road

Secondary Road

Primary Access Point

Secondary Access Point



Above: The revised conceptual future use framework that highlights areas for potential economic development (in purple), environmental management and education (in green), and outdoor recreation (in green).

Key Reuse Considerations and Potential Project Next Steps

1. Institutionalize and sustain the community's reuse planning capacity for the Eagle Zinc Superfund Alternative site over the long-term.

Reuse planning for the Eagle Zinc Superfund Alternative site represents an important first step that will inform both development of the site's remedy and the site's eventual reuse. In the years to come, as EPA works with the site's potentially responsible parties to remediate the site, the future planning efforts will need to focus on updating and implementing the project's reuse guidelines and Conceptual Future Use Framework, with the City of Hillsboro helping to steward the site back into successful use.

2. Prioritize opportunities for the community to engage with the Eagle Zinc Superfund Alternative site and, to the extent possible, phase the site's remediation so that portions of the site can be returned to use sooner rather than later.

As proposed in the project's Conceptual Reuse Framework, the eastern portion of the site could include areas for economic development, and the western portion of the site could include ecological areas and recreational walking trails. The phased reuse of portions of the site as the site's remedy is implemented could provide opportunities for community residents to enjoy new community amenities and learn about the site's remediation. Educational materials could include wall panels, maps, and photographs highlighting the site's history, the status of the site's remediation, and potential future uses at the site.

3. Resources for the ecological and recreational land uses outlined in the site's Conceptual Reuse Framework can be pursued in several different ways.

The City of Hillsboro, the site's PRPs, and other site stakeholders can work together to establish the Ecological Recreation Area. In addition, tax revenues from the site's Economic Development Area could be allocated to help fund ecological and passive recreation land uses at the site. Finally, there are a range of public and private sector organizations and government agencies that provide grant funding and technical assistance to support the restoration of ecological areas as well as environmental education and passive recreation opportunities.

4. Evaluate local regulatory considerations, primarily zoning regulations, that may need to be updated to enable appropriate economic development opportunities that do not negatively impact surrounding neighborhoods.

The City of Hillsboro's existing industrial zoning for the site would allow a wide range of heavy industrial land uses that could negatively impact surrounding neighborhoods as well as the natural environment. The city could consider updating the site's zoning to a more restrictive 'light industrial district standard', which would allow only light industrial land uses, like warehousing and/or transloading facilities.

5. Plan for the integration of the Eagle Zinc Superfund Alternative site with surrounding neighborhoods, roadways, and the City of Hillsboro's Central Business District.

The Conceptual Future Use Framework highlights opportunities for pathways and trails that will connect the site with area road networks and neighborhoods. Future planning efforts for the site include additional planning for the development of these off-site connections include planning for the development of these off-site connections.

6. Evaluate the potential for remedial partnerships between EPA, the City of Hillsboro, the PRPs, and local and regional wastewater treatment facilities.

The Conceptual Future Use Framework highlights the opportunity to create a landscape feature using the residue pile source material. Compost and biosolids are needed to ammend the residue pile source material and to help generate the soil formation process in order to support plant growth. There is a potential opportunity for the City of Hillsboro, EPA, and PRPs to partner with local and regional wastewater treatment and yard waste composting facilities to obtain the compost material needed for the residue pile's soil formation process.

Appendices

Appendix A: Site Reuse Resources

Government agencies and a range of public and private organizations can provide a range of technical assistance and funding to help facilitate the economic development, ecological, and passive recreational land uses outlined in this report. These programs and organizations include:

Economic Development and Capacity Building Resources

Economic Development Administration (EDA) – The EDA aids communities with substantial and persistent underemployment and unemployment by providing grants and technical assistance to support innovative economic development projects; aid in the development of public facilities and private enterprises; and help generate or retain long-term, private sector jobs and investment in communities. While Montgomery County does not qualify for assistance from the EPA, the EDA can still serve as a valuable information resource and may be able to qualify for assistance on a case-by-case basis. For more information, contact Jack Arnold, EPA's Economic Development Representative for Illinois, at 218-720-5326.

Heartland Center for Leadership Development – Through training programs, workshops, and research, this nonprofit organization helps rural towns develop the capacity and planning skills to adapt to change and leverage existing resources in a way that benefits local quality of life and the economy. For more information, call 402-474-7667 or 800-927-1115.

Illinois Department of Commerce and Economic Opportunity (DCEO) – DCEO is the state's lead economic development agency. DCEO's responsibilities range from workforce development to business financing, public infrastructure to tourism development, and from the creation of economic opportunities to recycling and energy development. For more information, call 217-782-7500.

National Center for Small Communities (NCSC) – This organization is dedicated to providing elected leaders of America's small communities with tools to govern effectively and the skills to expand local economies, protect natural resources, and preserve community character. The NCSC offers answers and how-to assistance on such issues as community capacity building, economic development, environmental planning and regulatory compliance, local government management, financing and budget, grassroots fundraising, and technology. For more information, call 202-624-3550.

Land Conservation and Habitat Restoration Resources

Illinois Conservation Foundation (ICF) Grant Program – This program supports activities that assist or enhance the biodiversity of wildlife habitat; assist in teaching young people, the disabled, or adults the benefits of conservation; or expose them to an outdoor experience such as hunting, fishing, camping, or enjoying Illinois' natural resources. The ICF encourages applications from non-profit organizations and local governments. The ICF gives precedence to grant applications which have matching funds at least equal to the amount being requested. For more information, call 217-785-2003.

Illinois Department of Natural Resources (IDNR) – IDNR activities focus on managing, protecting, and sustaining Illinois' natural and cultural resources. For more information, contact Steve Gonzales at 271-882-7481.

Illinois Environmental Protection Agency (IEPA) -- The mission of the Illinois Environmental Protection Agency (IEPA) is to safeguard environmental quality, consistent with the social and economic needs of the State, so as to protect health, welfare, property, and the quality of life. For more information, please refer to IEPA's website: www.epa.state.il.us

Illinois River Wildlife & Fish Refuge System – The U.S. Fish & Wildlife Service acquires and manages lands to conserve fish, wildlife, plants, and their habitats. Refuges are currently located in the nearby counties of Marshall, Fulton, and Mason. For more information, contact Ross Adams at 1-309-535-2290.

Land & Water Conservation Fund/Open Space Lands Acquisition and Development Program – This National Park Service program provides matching grants to local governments for the acquisition and development of public outdoor recreation areas and facilities. The program pays up to 50 percent of project costs, up to a maximum of $400,000. Funding assistance is provided for additions to existing parks, wildlife areas, nature preserves, beaches and greenways, parkways for public outdoor recreation, development of camping facilities, playgrounds and recreational trails, picnic

facilities, and fishing and hunting facilities. Contact Sue Eubanks, Grant Administrator, at 217-785-3884 or 217-782-7481.

The Nature Conservancy (TNC) – TNC is currently working to promote nature-based tourism in the Illinois River Valley. The mission of The Nature Conservancy is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Contact Joanne Skoglund in TNC's Havana, Illinois office at 309-547-2730 or by email at jskoglund@tnc.org.

United States Environmental Protection Agency Superfund Redevelopment Initiative -- EPA's Superfund Redevelopment Program helps communities return some of the nation's worst hazardous waste sites to safe and productive uses. While cleaning up these Superfund sites and making them protective, the Agency is working with communities and other partners in considering future use opportunities and integrating appropriate reuse options into the cleanup process. For more information, contact EPA's Region 5 Reuse Coordinator, Tom Bloom at 312-886-1967.

United States Tourist Council – This nonprofit association focuses on historic and scenic preservation, wilderness and roadside development, ecology through sound planning and education, and the support of scientific studies of natural wilderness. For more information, call 202-479-3395.

Building Demolition and Deconstruction Resources

The following section includes general construction and demolition resource links as well as descriptions of recycling operations located in closest proximity to Hillsboro.

Brandenburg Industrial Service Company uses specialized equipment to reduce disposal costs and increase salvage revenue through recycling of construction and demolition debris. Projects have included concrete recycling and scrap steel recycling, located in Chicago, IL, 247 miles from Hillsboro. www.brandenburg.info/salvage/index.html

ConcreteNetwork.com offers links to concrete demolition contractors throughout the US. Three contractors are listed for Illinois, located in Chicago, East Carondelet, and Glen Ellyn. www.concretenetwork.com/concrete/demolition/contacts/index2.html#IL

Illinois Environmental Protection Agency (IEPA) offers both a Construction and Demolition Site Recycling Handbook and a Construction and Demolition Site Recycling Directory. Both are available through the IEPA Helpline: 888-372-1996.

Mervis Iron and Metal is headquartered in Danville, IL, but has several locations, at least three of which deal with metals sorting and recovery, comprehensive recycling assistance for business and industry, and demolition and plant take-out services. Sister company General Steel and Metals is located in Mattoon, IL. This operation provides a network of operations that feed local community scrap to larger regional processing operations. www.mervis.com/sub/locations.asp

Omega Demolition uses specialized equipment processors and excavators to quickly remove hard to handle concrete and reinforcing steel. The concrete is crushed and recycled for onsite fill or offsite use, reducing transportation, handling, and disposal costs. Omega also works with customers to ensure savings through the sale of salvaged, used, decommissioned equipment and recyclables. located in Elgin, IL, 247 miles from Hillsboro. www.omega-demolition.com/Demolition.htm

OSWER Innovations Initiative: a program of EPA's Office of Solid Waste and Emergency Response (OSWER) which funds innovative pilot projects that demonstrate creative approaches to waste minimization, energy recovery, and recycling. This program encourages collaboration between EPA regional and headquarter program offices with co-regulators (i.e., Federal, State, interstate, intrastate, and local) and external stakeholders including public agencies and institutions, nonprofit private organizations, academia, and federally recognized Tribes. Contact Brigid Lowery at 202-566-0198 for more information.

Recycler's World includes links to recycling options for scrap iron and steel, wood, glass, and many other building elements. Links include online materials exchange programs that facilitate sale and exchange of goods, as well as information that assists users in locating the nearest recycling centers. www.recycle.net/recycle

Building Demolition and Deconstruction Resources (cont.):

Robinette Demolition, Inc. recycles building materials during the demolition process, located in Oakbrook Terrace, IL, 236 miles from Hillsboro. For more information, please reference: www.rdidemolition.com/

The Steel Recycling Institute has an online locator that identifies the nearest steel recycling facilities based on geographic information. According to the locator, both Springfield, IL and St. Louis, MO have two steel recycling facilities. For more information, please reference: www.recycle-steel.org

Additional funding for building demolition and deconstruction may also be available through state agencies and private foundations.

Stormwater and Watershed Management Resources

Heartland Water Resources Council of Central Illinois (HWRC) - The HWRC focuses its efforts on improving the condition of the Illinois River and its watershed through public education, partnerships, and other activities. For more information, contact Tom Tincher at 309-637-5253.

The ***Illinois Environmental Protection Agency (IEPA)*** - IEPA is responsible for administering the state's stormwater program. IEPA stormwater requirements are modeled after federal National Pollutant Discharge Elimination System (NPDES) stormwater requirements, which stipulate that stormwater be treated to the maximum extent practicable. For more information, plesase reference: www.stormwaterauthority.org/regulatory_data/state.aspx?id=134

The ***Internet Guide to Financing Stormwater Management*** - This web site was developed by the Center for Urban Policy and the Environment at Indiana University-Purdue University Indianapolis (IUPUI), in cooperation with the Watershed Management Institute, Inc. The web site was designed to help communities find ways to fund stormwater management projects. For more information, please reference: www.stormwaterfinance.urbancenter.iupui.edu

Recreation Development Resources

Illinois Bicycle Path Grant Program – This Illinois Department of Natural Resources (IDNR) program provides financial assistance to local governments for the acquisition, construction, and rehabilitation of public, nonmotorized bicycle paths and directly related support facilities. Assistance up to 50 percent of approved project costs, with a maximum $200,000 annual award for development projects, is available through the program. For additional information, contact Steve Gonzales at 217-782-7481.

The International Ecotourism Society (TIES) – TIES is dedicated to finding resources and building expertise to make tourism a viable tool for conservation and sustainable development. TIES offers courses in investment and financing as well as tutorials on the planning, design, and operation of eco-lodges. For more information, contact TIES at 202-347-9203.

National Center for Bicycling and Walking – This organization provides information, training and education on bicycle and pedestrian facility planning, design & engineering; education and safety research and programs; effective advocacy techniques; and trails and greenway development. For more information, call 202-463-6622 or 201-656-4220.

The Peoria Park District – The Peoria Park District offers educational materials and tours to parties interested in nature-based tourism opportunities. The District can also provide tours of the District's RiverPlex Recreation & Wellness Center. For more information, contact Bonnie Noble at 309-682-1200 ext. 210.

Rivers, Trails, and Conservation Assistance Program – This National Park Service program works with community groups and local and State governments to conserve rivers, preserve open space, and develop trails and greenways. The technical assistance offered through this program includes resource assessments, concept plans development, resources funding, and the provision of conservation and recreation information. For more information, contact Diane Banta or Andre Gaither at 312-427-3688.

Appendix B: Industrial Site Restoration and Reuse Case Studies

Cherokee County Superfund Site

Cherokee County, Kansas

One hundred years of mining left the Cherokee County Superfund site looking desolate. There was no vegetation, only mounds of gray rock and gravel. Pits and craters filled with murky water covered the ground. Dangerous levels of lead, cadmium, and zinc had washed into nearby streams and seeped into the groundwater. But all of that has changed due to EPA's cleanup efforts. Recently, 900 acres of the site were restored to their former natural state with tall native grasses, streams, and wildlife. This dramatic transformation took place after EPA acted to prevent the hazardous contaminants from endangering nearby residents and further damaging the area's surface and groundwater.

The 115-square-mile Cherokee County site in Kansas is part of the inactive lead and zinc mining area called the Tri-State Mining District. The District covers 500 square miles in southeastern Kansas, northeastern Oklahoma, and southwestern Missouri. From the late 1800's to the early 1970's, mining in the area produced more than 500 millions tons of mining wastes. Because the Cherokee County site is so large, EPA separated it into six subsites to help speed up site investigations and cleanup activities. EPA began investigating the portion called the Galena subsite in 1985, and determined that the shallow groundwater aquifer and surface water were contaminated with high concentrations of metals as a result of the mining, milling, and smelting of lead and zinc ores. After ensuring that residents with private wells in the area had safe drinking water, the agency collected and consolidated contaminated surface mine wastes and buried them in abandoned mine pits and shafts on the site. The land was then recontoured with clean soil, streams were diverted to avoid the stored wastes, and the entire area was planted with native vegetation.

Today, a 900-acre portion of the subsite has been fully restored and is once again a safe habitat for wildlife. The Kansas Department of Health and Environment closely monitors the surface and groundwater to ensure that they remain free from metals contamination. EPA's cleanup efforts and the cooperation of the State and local residents helped turn what was a hazardous eyesore into an ecological success.

Positive Economic Impacts:

Short-term

- 20 jobs during cleanup and redevelopment
- $485,600 in annual income resulting from short-term cleanup and redevelopment jobs

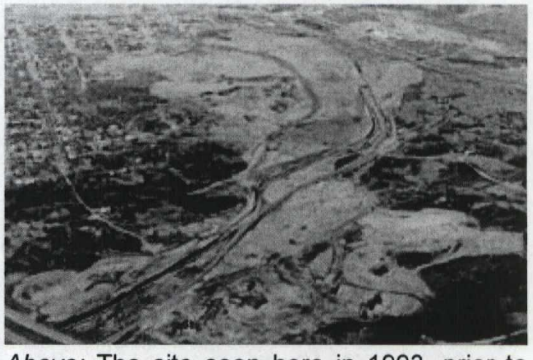
Long-term

- Improved appeal of Galena as a residential community for workers commuting to Joplin, Missouri
- Increased potential to attract new light industry to Galena

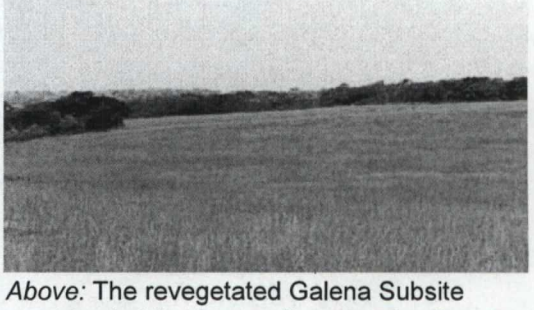
Environmental and Social Benefits:

- Reduced health risks from heavy metals in drinking water
- Improved ecosystem health
- Created wildlife habitat
- Improved protection of drinking water sources
- Improved aesthetics
- Made portions of land available for light industrial development and grazing
- Increased community morale

Information obtained from EPA's Superfund Redevelopment Initiative website:
www.epa.gov/superfund/programs/recycle/success/casestud/chercsi.htm



Above: The site seen here in 1993, prior to cleanup, illustrates the impact of decades of mining activities on the landscape. *Source: EPA*



Above: The revegetated Galena Subsite provides habitat for small mammals. *Source: EPA*

Lost Marsh Golf Course

Hammond, IN

Before the Lost Marsh golf course in Hammond, Indiana became home to a nine-hole youth course and a full adult course, it was a Brownfield site consisting of a 50-year old slag pile. The project is the largest public brownfield redevelopment in the state and one of the largest in the region.

The youth course was a combined effort between the city and several professional golf organizations to get kids interested in golf and provide affordable courses. The course has received a $75,000 grant from the United States Golf Association and $100,000 from the World Golf Foundation. The entire development was expected to cost about $6 million. The Hammond City Council approved a $4.9 million bond, using tax increment financing, for the work. The project included separate clubhouses for the First Tee program and public course, driving range and practice areas.

"This site, once best described as a moonscape, is now an environmental treasure rich with greenery, wildlife and recreational opportunities," said Hammond Mayor Duane Dedelow Jr. "Like many parts of our nation, this area grew thanks to heavy industry that brought good jobs and good wages to residents. But that industry also left behind scars on our land.

Demonstrating that a golf course can restore life to an extensively contaminated waste area, Lost Marsh of Hammond Golf Course in Hammond, IN, and its former superintendent, Christopher S. Gray, have been named the overall winners of the 2003 Golf Course Superintendents Association of America (GCSAA)/Golf Digest Environmental Leaders in Golf Awards (ELGA).

For more information on the Lost Marsh Golf Course in Hammond, Indiana:
www.lostmarsh.com/index2.htm
www.cybergolf.com/news/golfnews1804.asp

Above left: Entry sign to the Lost Marsh Golf Course in Hammond, IN. *Source: E² Inc., Fall 2005*

Above: View of the Lost Marsh golf course. Note the grassy mounds, which are piles of grass covered slag. *Source: www.lostmarshgolf.com*

Left: View of the trail that extends through the lakeside wetland restoration area. *Source: www.lostmarshgolf.com*

Palmerton Zinc Superfund Site

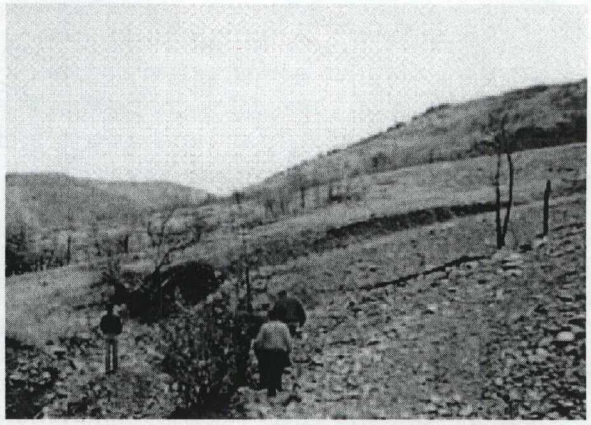
Palmerton, PA

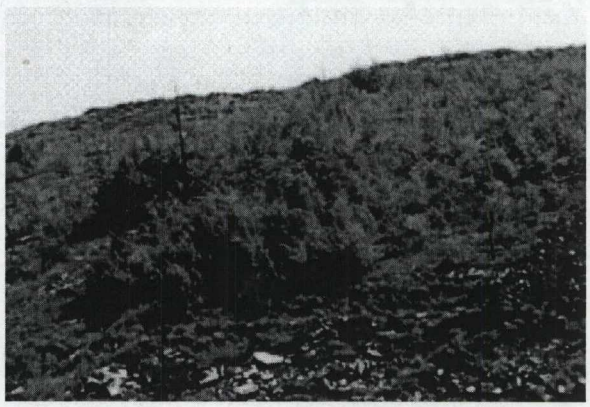
Site Description

The Palmerton, PA-based Palmerton Zinc Pile Site, the site of a former primary zinc smelting operation, encompasses the Borough of Palmerton and surrounding areas, Blue Mountain, a large smelting residue pile called the Cinder Bank, and much of the valley. For nearly 70 years, the New Jersey Zinc Company depositied 33 million tons of slag at the site, creating a cinder bank that extends for 2 ½ miles and measures over 100 feet high and 500 to 1,000 feet wide.

Blue Mountain, Operable Unit #1

The Blue Mountain, operable unit #1, consists of approximately 2,000 acres of the north slope of the mountain defoliated as a result of emissions from the historic smelter operations in Palmerton. Contamination including zinc, copper, lead and cadmium from the zinc smelting operations caused the defoliation of approximately 2,000 acres of the mountain and the heavy zinc deposits prevented the regrowth of vegetation. EPA performed the RI/FS for Blue Mountain and issued a ROD for OU 1 on September 4, 1987. The remedial alternative selected in this ROD provides for application of a biosolids sludge/fly ash mixture to the slopes of Blue Mountain and planting grass seed and tree seedlings in the sludge/fly ash mixture to form a vegetative cover. The vegetative cover has helped to minimize soil erosion, restore the forest, and prevent contaminated soil from running off and contaminating surface waters. A Consent Decree between EPA and Zinc Corporation of America ("ZCA"), a division of Horsehead Industries, Inc., ("HII") for implementation of the ROD for OU 1 was entered by the U.S. District Court for the Middle District of Pennsylvania on October 18, 1988.





Above: View of the Blue Mountain operable unit #1. Note the infertility of the soil due to the presence of slag. Source: www.dep.state.pa.us/dep/deputate/airwaste/wm/remserv/nrd/Palmerton%20Fact%20Sheet%20Final.pdf

Below: Typical conditions on Blue Mountain after application of biosolids, limestone, potash and fly ash. Source: www.biosolids.org/docs/source/CarbonPA.pdf

Cleanup Progress

Following several years of pilot testing, Zinc Corporation of America (ZCA) began full scale implementation of the revegetation of Blue Mountain in 1991. From 1991 through 1995, ZCA applied a mixture of fly ash, sewage sludge, and a combination of grass and tree seeds on approximately 1,000 acres of the mountain. Currently, approximately 1,000 acres have been successfully revegetated with grasses by ZCA at the Site; however, fungal disease, competition with plants, and foraging animals have hindered tree seed growth. An additional 1,000 acres remain to be revegetated and efforts may need to be made to grow trees and other larger types of vegetation on all of the approximately 2,000 acres which comprise the Blue Mountain OU.

Partnership for Success

The success of the Palmerton restoration effort will rely on extensive cooperation between Federal, State, and local agencies, and the companies involved with this site. Throughout this process, the Trustees will seek public involvement and partnerships with non-profit organizations, private organizations, and individuals to work together to secure a healthier ecosystem and a cleaner environment for people to enjoy.

For more information on the Palmerton Zinc Superfund site:
www.epa.gov/reg3hwmd/super/sites/PAD002395887/index.htm
www.biosolids.org/docs/source/CarbonPA.pdf

Milwaukee Menomonee Valley Stormwater Park

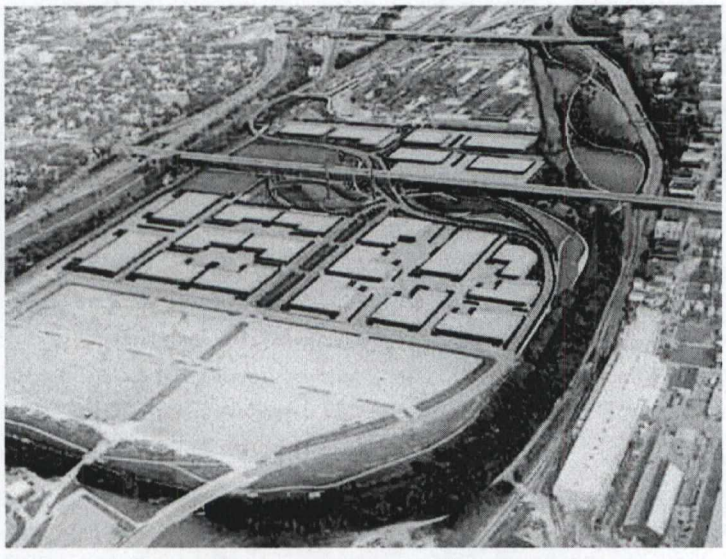
Milwaukee, Wisconsin

In November 2004, Mayor Tom Barrett and Department of City Development Commissioner Rocky Marcoux announced the successful completion of the Milwaukee's largest environmental clean up project. The project remediated environmental problems at a 140-acre site, just east of Miller Park in the Menomonee Valley. The property is being redeveloped as a new business park and recreation area.

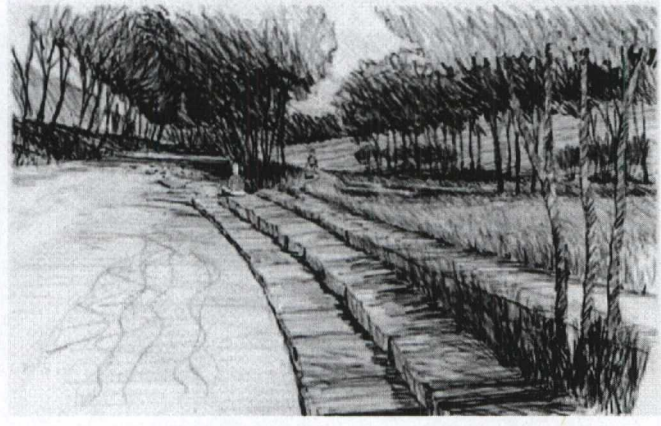
"The vacant eyesore of the 1980s is gone and finally the renewal can begin," said Mayor Tom Barrett. While a congressman, Mayor Barrett secured $3 million in federal brownfield grants to clean up the former Milwaukee Road Shops site. "Milwaukee's most visible eyesore is now one of our most visible opportunities to attract jobs to this city."

The site was formerly a rail yard and contained several manufacturing plants, employing 3,000 Milwaukeeans in the early 1900s. The Milwaukee Road owned the land until the railroad went bankrupt in 1977. The $20 million clean up project included 23 federal and state brownfield grants to address the contaminated soil, old foundations and miles of relic brick sewers. Asbestos was removed and the soil was capped to protect human health and the environment. Excess soil from the Marquette Interchange work will be added to portions of the site, keeping the road project costs down and aiding in the redevelopment of the land.

Included in the Menonomee Valley Master plan is Wisconsin's most innovative natural stormwater treatment system adjacent to the new business park and Menomonee River. The 'Stormwater Park' will help businesses in the new park meet stormwater regulations. The land is expected to capture every drop of rain that falls on the business park. "Stormwater Park" will feature native plantings that can filter and cleanse all the stormwater run-off from the 100-acre business park. For more information, please refer to: www.renewthevalley.org/projects/project.html?a=show&pid=2.



above left: Conceptual simulation of Milwaukee's Menomonee Valley Industrial Park and 'Stormwater Park' design. *Source: Wenk Associates, 2002*



above: Conceptual drawing of the 'Stormwater Park' design along the Menomonee River. *Source: Wenk Associates, 2002*

Appendix C: Community-Scaled Economic Development Case Studies

While the Eagle Zinc site's size and infrastructure, among other factors, suggest that portions of the site may be well-suited for larger scale manufacturing, processing, and warehouse operations, other portions of the site may be well-suited for smaller-scale niche businesses as well. These economic development alternatives could help address local community concerns that future uses at the site be scaled appropriately and fit with surrounding land uses, not create negative environmental impacts, and be sustainable and provide jobs that build the community's workforce capacities over the long-term. This section of the report describes some of these potential economic development alternatives in greater detail, summarizing their characteristics and providing examples and links to additional information.

Introduction

Over the past fifty years, the national economy has undergone a large-scale transition. An industrial manufacturing sector fueled by a vast natural resource base, has driven regional economies throughout the United States for over a century. Increasing competition from oversees industries and the depletion natural resources have altered the structure of regional economies nationwide. Many of the industries responsible for the processing, storage, distribution and sales of manufactured goods have either disappeared or have been replaced by increasingly specialized emerging industries. Information & technology, education, health care, financial and general services have supplanted industrial manufacturing as the core drivers of today's economy. As a result of this shift, local economies that have historically depended upon a strong industrial manufacturing base are struggling to identify viable economic development alternatives.

Traditional economic development strategies have focused on recruiting regional or national scale industries, in order to increase tax bases and generate wages for local workers. While industrial recruitment offers the possibility of bringing economic gains in the short term, the capital is rarely reinvested in the community. However, many communities are adapting and have begun to build on their unique strengths and location-specific advantages. Communities are harnessing local resources and skills, developing new economic opportunities and maintaining local business ownership. Compiled here is a list of economic development strategies, commercial and industrial uses that were selected for their compatibility with community-scaled economic revitalization.

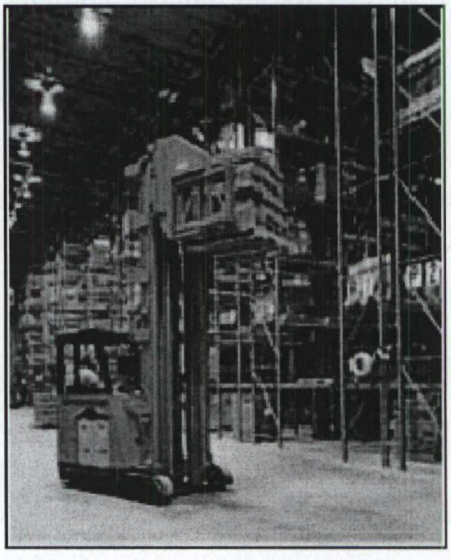
Warehousing & Distribution

While warehousing and distribution facilities are not a new form of industrial land use, they have become increasingly important components of the United States economy for two primary reasons. First, the economy's transition from a centralized manufacturing to a service- and consumer-oriented economy has placed a greater emphasis on the rapid and efficient movement of goods to important markets. Second, there has been increased demand from U.S. manufacturers for the efficient or "just-in-time" delivery of components and materials from suppliers in order to minimize the need to maintain large on-site inventories.

Regional Warehouses:
Regional warehouses store a supply of goods for a particular region. They offer a central storage function for companies, often improving inventory levels while reducing overall operating costs. They often consist of large, often low-rise storage facilities with provisions for truck loading and parking. A small proportion of office space may be included, either as finished space built into the storage areas or housed in separate office structures.

Transloading Facilities:
Transloading facilities are centralized warehousing and distribution locations designed to facilitate the efficient movement of goods between truck and rail transportation. Manufacturers can bring their products or materials to a transloading facility to be loaded on a train for direct distribution or shipment to another transloading facility. Products or materials arriving at the transloading facility can be placed on trucks for delivery to their final destination. Transloading facilities typically handle bulk and commodity goods such as food, building material, automobiles, lumber, paper, metals, aggregates, and plastics. While transloading facilities vary widely in size, they typically include indoor and outdoor storage areas and must have at least one on-site rail spur.

Bulk Warehouses:
Bulk warehouses are warehousing and distribution facilities designed to store large quantities of goods for varying periods of time, ranging from long-term storage to immediate distribution. Bulk warehouses range in size from a minimum of 100,000 square feet up to 1 million square feet and have large areas for parking, truck maneuvering, and trailer storage. Other core features of bulk warehouse facilities include their extensive loading capabilities and high ceilings (20-30 feet) for racked storage. Bulk warehouses can serve a wide range of tenants, including manufacturing companies that store parts and goods, logistics companies that distribute goods for other companies, and retailers that store products before shipping them to retail outlets or consumers. While bulk warehouses can serve similar functions to transloading facilities, their primary function is to facilitate the distribution of goods across a region via truck transportation.



Community Development Capacity

Rural Training Center:

Communities in rural America often struggle to attract high wage jobs, and one of the contributing factors has traditionally been a lack of high-skill laborers in the local and regional workforce. Industrial re-training or workforce training programs provide a community-based mechanism for increasing local development capacity.

Training centers typically coordinate with new or existing business to generate employment opportunities and on-the-job training for local workers, increasing community capacity to attract higher wage jobs in the future. Training centers require a cooperating business to provide job opportunities and wages, while additional programming (job matching, career skills training) can be handled through a community development organization or other non-governmental organization.

The Alabama Federation of Southern Cooperatives operates a rural training center in northeastern Alabama offers adult basic education, a welfare to work program and industrial retraining. An apprentice program coordinated by the Arkansas Wood Manufacturer's Association and the Arkansas Rural Enterprise Center trains young people and mid-career professionals to become skilled wood workers, simultaneously helping workers obtain new job skills and generating a skilled workforce to drive the regional wood products economy.

Resources:
Alabama Federation of Southern Cooperatives: www.sustainable.doe.gov/success/champion.shtml#FSC
Arkansas Rural Enterprise Center: www.winrock.org

Business Incubator:

Business incubators generally provide management guidance, technical assistance, and consulting to assist young and growing companies in becoming successful firms. As organizations learn and mature they graduate from the program as financially viable and freestanding businesses. Incubator graduates have the potential to create jobs, revitalize neighborhoods, commercialize new technologies, and strengthen local and national economies. Historically, incubators have targeted the technology industry and mixed-uses of light industry, technology, and service firms. More recently, incubators have supported food processing, medical technology, space and ceramics technologies, arts and crafts, and software development.

Resources:
Center for Emerging Technologies, St. Louis, Missouri: www.emergingtech.org
National Business Incubator Association: www.nbia.org/resource_center/bus_inc_facts/index.php

far left: Consulting session at Cincinatti Business Incubator, Inc.

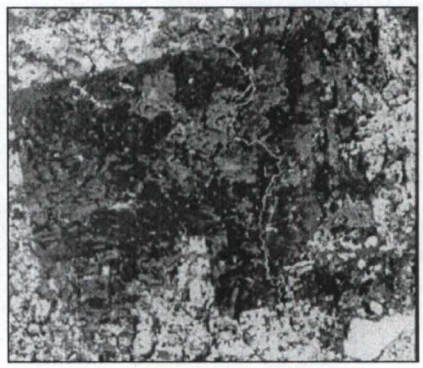
left: Experienced teachers mentor young people in the Arkansas Rural Enterprise Center's workorce training program

Community Forestry:

Historically, forestry communities in the U.S. have experienced large-scale destruction of forest resource bases, while also struggling with high rates of poverty and unemployment. Community forestry operations aim to bring forest ownership, management and timber production into local ownership, giving communities more control over both the forest resources and the local economy. Community forestry activities range from sustainable forest management practices to value-added timber processing. Community-oriented forestry operations are flexible in scale and can be tailored to the resource and economic needs of individual places. The Menominee Tribal Forest in northern Wisconsin is an excellent example of a community forestry initiative that integrates sustainable resource management and value-added wood processing.

Resources:
Menominee Tribal Enterprises, Menominee County, WI:
www.menominee.edu/sdi/csstdy.htm#land
www.ncfcnfr.net/resources.html

EPA's Sustainable Forest management Case Study on Menominee Forest:
www.epa.gov/glnpo/ecopage/upland/menominee/
www.ncfcnfr.net/resources.html



left: This aerial photograph shows the Menoninee Forest in northeastern Wisconsin. The dark area denotes the sustainable managed forestland surrounded by farms, pastures and developed land.

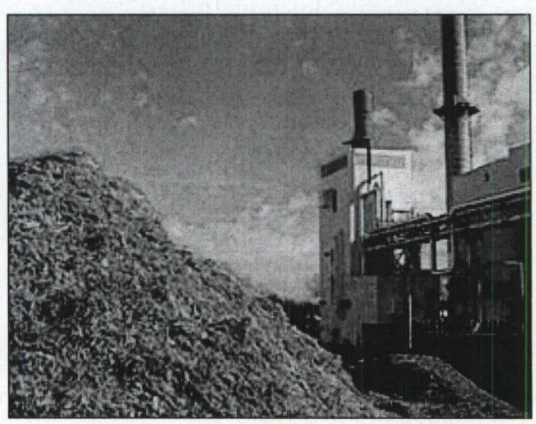
Biomass Generator / Combined Heat & Power Plant:

Biomass is an innovative renewable energy technology that harvests energy by burning recycled wood and organic wastes. When biomass (wood, organic wastes) are burned, heat is produced. This heat is typically captured in water and converted to steam, which is then used to spin turbine generators, converting heat energy into electricity. A typical commercial-scale biomass generator (25 MW) can produce enough electricity to power roughly 25,000 homes.

Increasingly, biomass generators are being installed in facilities called combined heat and power plants (CHPs), which use a process called district heating to distribute any excess heat energy to a small group of buildings or users. Biomass-CHP systems have been successfully used to provide electricity and thermal needs for industrial or business parks, representing a critical step in the development of community-scaled energy production. In Richford, Vermont, a community-scaled biomass plant burns wood chips from local sustainable forestry operations to generate electricity and heat for local businesses.

Resources:
Richford Wood Initiative, Richford, VT:
www.ncfcnfr.net/richford.html

left: The McNeil biomass-fired power plant, located in Burlington, Vermont's intervale eco industrial park, is operated by the city-owned utility Burlington Electric Co.



Eco-Industrial Parks

An eco-industrial park is a group of businesses clustered in a single location working collectively to reduce or eliminate some form of waste associated with their industrial processes (e.g., heat, steam, carbon dioxide, and various chemical and material byproducts). By exchanging services between businesses in the park or community, tenants are able to generate savings by improving efficiency and reducing operating costs. Often, one core industrial business, such as a power plant or processing company, serves as an anchor tenant that attracts other businesses interested in utilizing/sharing their waste products. Combined heat and power plants commonly sell or distribute excess heat energy in to other business to supplement heating needs.

The Intervale , Burlington, VT

The Intervale in Burlington, Vermont is a unique and highly successful eco-industrial park. Located on a 700-acre parcel of land within the Burlington city limits, the Intervale hosts a combination of community oriented enterprises. The Burlington Electric Company operates a biomass generator. An organic resource recovery operation collects yard clippings and household compost and sells the processed wastes as a sterilized garden compost soil amendment. The Center for Farm Innovation works with local farmers to identify new market niches and revenue streams. And the rich flood plains of the Winooski River support a handful of farms and community gardens.

Ecological Industrial Park, Londonderry, NH

The town of Londonderry, New Hampshire is also using the principles of industrial ecology to orchestrate economic development and limit commercial sprawl in the southern part of the state. Organic yogurt producer, Stonyfield Farms operates a facility and functions as the primary industrial tenant in the park. A plastic recycling company purchases plastic waste products from Stonyfield Farms for reproduction. And the park is expanding to include a 720 megawatt natural gas powered generating plant which will provide power to Stonyfield Farms and the plastic recycling facility. Londonderry's efforts illustrate how how indusial ecology's principles can be applied to help cooperating industries develop a compeitive advantage.

Resources:
Intervale, Burlington, VT: www.intervale.org/Overview.htm#ventures
Ecological Industrial Park: Londonderrry, NH, www.smartgrowth.org/casestudies/ecoin_stonyfield.html

Value-added Corn Processing

Traditionally, corn growers throughout the Midwest have sold their unprocessed crops to larger corporations. Increasingly, growers are pooling their resources, working together and processing their crops in small-scale cooperatively owned plants. The 1200-member Minnesota Corn Processors operates a wet-milling plant that produces cornstarch, syrup, high-fructose syrup and ethanol. The plant employs 100 people, processes 11 million bushels of corn and generates $50 million each year.

Corn-based Ethanol Production

Ethanol fuels are a rapidly expanding sector of the economy. Production of ethanol fuels has quadrupled in the last twenty years, and energy economists argue that ethanol gasoline additives are a viable transitional strategy for renewable fuels. In the upper mid-western United States, cooperatively owned ethanol production plants are emerging as community-based development alternatives for agricultural economies. Most successful cooperatives rely on corn for an ethanol source. The average production capacity for a corn-based ethanol plant is between 15-30 million gallons / year, and cooperative membership can range anywhere from 100-1000 members. The Southwest Minnesota Agrifuels Cooperative generates local market demand for corn growers by purchasing bushels and then paying out annual dividends.

Resources:
Minnesota Corn Processors, Marshall, MN:
www.sustainable.doe.gov/success/champion.shtml#FSC
Southwest Minnesota Agrifuels Cooperative:
www.farmprofitability.org/research/agrifuels/agrifuels.htm

Industrial Manufacturing

Cellular Phone / Consumer Electronics Remanufacturing

Communication technology is built on a culture of innovation and change, and today's cellular phone industry is no exception. The typical cellular phone has a relatively short life, however companies are beginning to analyze the product life-cycle for consumer electronics and are discovering a demand for remanufactured or recycled products. Entronix, an information technology and remanufacturing company, purchases used cell phones, global positioning system receivers and wireless routers and converts them into reconditioned products. Entronix International, Inc. recently located a 30,000 s.f. remanufacturing facility in the former taconite and iron mining town of Eveleth, Minnesota. The enterprise employs 180 workers and integrates several local technical and community colleges in an industrial retraining program.

Resources:
Iron Range Rehabilitation and Resources Board, Eveleth, ME,:
www.irrrb.org/business/viewsuccess.php?&storyid=14

Right: Entronix, LLC works to extend the life of cellular phones, employing 180 skilled laborers in Minnesota's Iron Range region

Wind Tower Manufacturing Plant

Wind energy is the nation's fastest growing energy technology. Energy companies are planning and developing commercial wind farms throughout the Upper Midwest, Appalachia and Rocky Mountains. Wind tower manufacturing is emerging as a regional niche market. Aerisyn Energy, LLC recently established a wind tower manufacturing plant in Chattanooga,Tennessee. The 150,00 s.f. manufacturing operation produces 200 towers annually and supports 75 employees.

Resources:
Chamber of Commerce, Chattanooga, TN :www.chattanoogachamber.com/newsandvideo/aerisyn_locates.asp

Right: Wind energy: the nation's fastest growing energy technology

Appendix D: List of Project-Related Acronyms

AR - (*Administrative Record*): List of all EPA documents used to develop a response action for a Superfund site. The AR culminates in the record of decision for remedial action or an action memorandum for removal actions.

ASTM - (*American Society for Testing and Materials*): ASTM International is a not-for-profit organization that provides a global forum for the development and publication of voluntary consensus standards for materials, products, systems, and services.

ASTSWMO - (*Association of State and Territorial Solid Waste Management Officials*): Association that focuses on the needs of state hazardous waste programs, non-hazardous municipal solid waste and industrial waste programs, recycling/minimization/reduction programs, Superfund/State cleanup programs, and underground storage tank and leaking underground storage tank programs.

ATSDR - (*Agency for Toxic Substances and Disease Registry*): Federal agency within the Department of Health and Human Services tasked to prevent exposure and adverse human health effects and diminished quality of life associated with exposure to hazardous substances from waste sites, unplanned releases, and other sources of pollution present in the environment.

CERCLA - (*Comprehensive Environmental Response, Compensation, and Liability Act (1980)*): The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

CERCLIS - (*Comprehensive Environmental Response, Compensation, and Liability Information System*): The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) is EPA's database management system, which maintains a permanent record of all information regarding all reported potential hazardous waste sites.

CIC - (*Community Involvement Coordinator*): EPA staff member responsible for Agency's community involvement activities at Superfund sites. The CIC coordinates community meetings, explains Agency activities, and works with communities to address local concerns and priorities.

EPA - (*Environmental Protection Agency*): Federal agency whose mission is to protect human health and safeguard the natural environment.

HAZMAT - (*Hazardous Materials*): Chemicals, usually the by-products of industrial processes, that pose a danger to human health and the environment.

HRS - (*Hazard Ranking System*): The HRS is the scoring system used by EPA's Superfund program to assess the relative threat associated with actual or potential releases of hazardous substances. The HRS is the primary screening tool for determining whether a site will be included on the National Priorities List (NPL), EPA's list of priority sites identified for possible long-term remedial action under Superfund. The scoring system assigns each site reviewed a value between 0 and 100. A score of 28.5 or higher means that the site is eligible for listing on the NPL.

IDNR - (*Illinois Department of Natural Resources*): The Illinois Department of Natural Resources has the responsibility to to manage, protect and sustain Illinois' natural and cultural resources; provide resource-compatible recreational opportunities and to promote natural resource-related issues for the public's safety and education.

IEPA - (Illinois Environmental Protection Agency): The mission of the IEPA is to safeguard environmental quality, consistent with the social and economic needs of the State, so as to protect health, welfare, property and the quality of life.

NCP - (*National Contingency Plan*): The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan or NCP, is the federal government's blueprint for responding to both oil spills and hazardous substance releases.

NPL - (*National Priorities List*): The NPL is EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. The list is based primarily on the score a site receives from the Hazard Ranking System. EPA is required to update the NPL at least once a year. A site must be on the NPL to receive money from the Trust Fund for remedial action.

O&M - (*Operations and Maintenance*): Activities conducted after a Superfund site remedial action is completed to ensure that the site remedy remains effective in the future.

OSRTI - (*Office of Superfund Remediation and Technology Innovation*): Manages the Superfund program, which was created to protect citizens from the dangers posed by abandoned or uncontrolled hazardous waste sites. Congress established Superfund through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

OSWER - (*Office of Solid Waste & Emergency Response*): The Office of Solid Waste and Emergency Response (OSWER) develops guidelines and standards for the land disposal of hazardous wastes and underground storage tanks. OSWER also implements a program to respond to abandoned and active hazardous waste sites and accidental releases, including some oil spills, and encourages the use of innovative technologies for contaminated soil and ground water.

PA - (*Preliminary Assessment*): The PA is the first stage of EPA's site assessment process. It is a relatively quick, low-cost compilation of readily available information about a site and its surroundings. The PA emphasizes identifying populations and other targets that might be affected by a site's contamination. It includes a reconnaissance of the site and surrounding area, but not environmental sampling. The PA is designed to distinguish between sites that pose little or no potential threat to human health and sites that warrant further investigation.

PCOR - (*Preliminary Closeout Report*): EPA report that documents the completion of a site's remedy.

PRP - (*Potentially Responsible Party*): A party that has been identified by EPA as being liable for the costs of remediation at a contaminated site.

RA - (*Risk Assessment*): Qualitative and quantitative evaluation of the risk posed to human health and/or the environment by the actual or potential presence and/or use of specific pollutants.

RCRA - (*Resource Conservation and Recovery Act of 1976*): The regulatory system that manages hazardous waste from its generation to final disposal. RCRA imposes standards for transporting, treating, storing, and disposing of hazardous wastes. It is designed to prevent the creation of new hazardous waste sites by authorizing EPA to take administrative, civil, and criminal actions against facility owners and operators who do not comply with RCRA requirements.

RD/RA - (*Remedial Design / Remedial Action*): Remedial Design (RD) is the phase in Superfund and Supefund Alternative site cleanup where the technical specifications for remedies and technologies are decided. Remedial Action (RA) follows the remedial design phase and involves the actual construction or implementation phase of Superfund and Supefund Alternative site remediation. The RD/RA is based on the specifications described in a site's record of decision (ROD).

RI/FS - (*Remedial Investigation / Feasibility Study*): After a site is listed on the NPL or Supefund Alternative site list, an RI/FS is performed at the site. The RI serves as the mechanism for collecting data, while the FS is the mechanism for developing, screening, and evaluating alternative remedial actions. The RI and FS are conducted concurrently. Data collected in the RI influence the development of remedial alternatives in the FS, which in turn affect the data needs and scope of treatability studies and additional field investigations.

ROD - (*Record of Decision*): This EPA document presents the final remediation plan for a site. It documents all activities prior to selection of the remedy, and provides a conceptual plan for activities subsequent to the ROD. The purpose of the ROD is to document the remedy selected, provide a rationale for the selected remedy, and establish performance standards or goals for the site or operable unit under consideration. The ROD provides a plan for site remediation, and documents the extent of human health or environmental risks posed by the site or operable unit. It also serves as legal certification that the remedy was selected in accordance with CERCLA and NCP requirements.

RPM - (*Remedial Project Manager*): EPA staff member responsible for the management of a site's remediation. A site's RPM directs all investigations, planning, remedial activities, and manages technical, legal, and community relations issues at assigned sites. The RPM also directs contractual efforts to ensure proper allocation of funds and that contractor activities are effective and efficient.

SARA - (*Superfund Amendments and Reauthorization Act of 1986*): This legislation amended the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1986. SARA's changes stressed the importance of permanent remedies and innovative treatment technologies in cleaning up hazardous waste sites; required Superfund actions to consider the standards and requirements found in other state and federal environmental regulations; provided new enforcement authorities and settlement tools; increased state involvement in every phase of the Superfund program; increased the focus on human health problems posed by hazardous waste sites; encouraged greater citizen participation in site remediation plan designs; and increased the size of the Trust Fund to $8.5 billion.

SA sites - (*Superfund Alternative sites*): SA sites are remedial sites that would otherwise be eligible for the National Priorities List (NPL), but are being handled through an alternative process. In an effort to reduce transaction costs and speed up the cleanup at sites with cooperative potentially responsible parties (PRPs), EPA signs an agreement with the site PRPs that they must meet all the same technical requirements as at a regular NPL site, but without going through the formal NPL listing procedure.

SI - (*Site Inspection*): Part of EPA's site assessment pipeline. The SI is a dynamic process tailored to the specific circumstances of individual sites; it is not a standardized process to be repeated at every site. The objective of the SI is to gather information to determine if a site poses a threat to human health or the environment in order to support a site decision regarding the need for further Superfund action. The SI begins by verifying the hypothesis put forth in the PA by collecting and analyzing wastes and environmental media samples to determine whether hazardous substances are present at a site and are migrating into the surrounding environment. The SI data is used for removal actions, other response actions, and to determine if the site is eligible for inclusion on the NPL.

SRI - (*Superfund Redevelopment Initiative*): A national EPA program that focuses on the return of Superfund and Supefund Alternative sites to productive use, the development of site remedies consistent with a community's reasonably anticipated future land use, and the facilitation of the reuse of sites where appropriate. SRI's website provides links to multiple tools, including Ready for Reuse Determinations, partnership opportunities, and ongoing programs, that can help communities, localities, EPA and state agency staff, and other interested parties work together to facilitate the reuse of Superfund sites.

TRI - (*Toxics Release Inventory*): Database of toxics releases in the United States compiled from SARA Title III Section 313 reports containing information concerning waste management activities and the release of toxic chemicals by facilities that manufacture, process, or otherwise use such materials. Citizens, businesses, and governments can then use this information to work together to protect the quality of their land, air, and water.

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